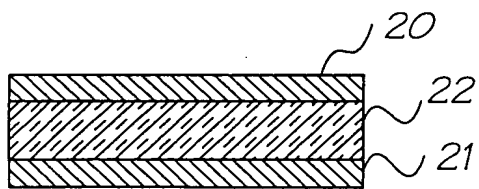


FIG. 3



↓ Cooling

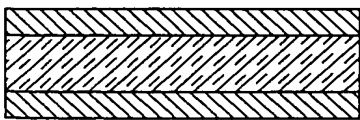
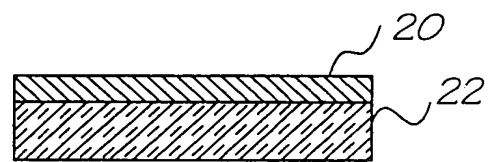


FIG. 4



↓ Cooling

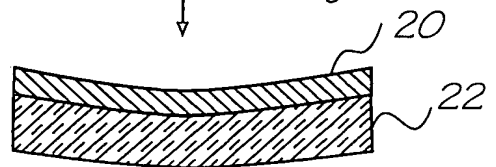


FIG. 5

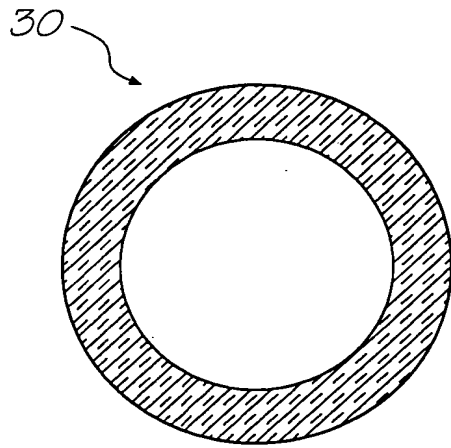


FIG. 6

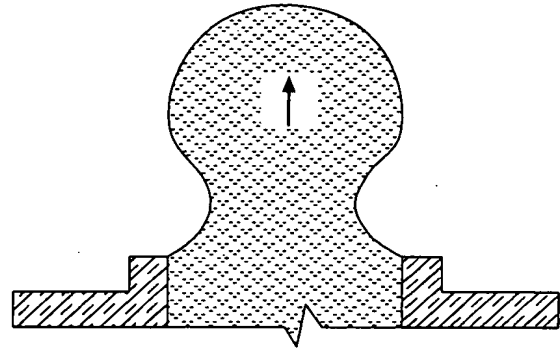


FIG. 7

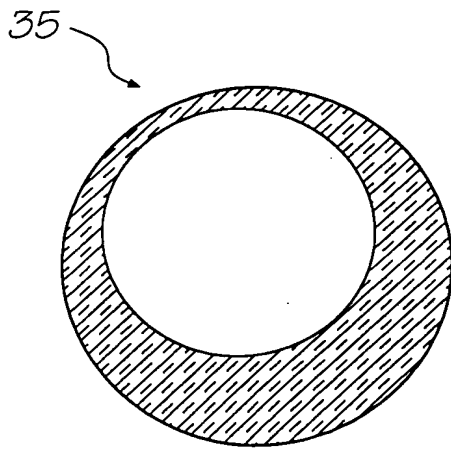


FIG. 8

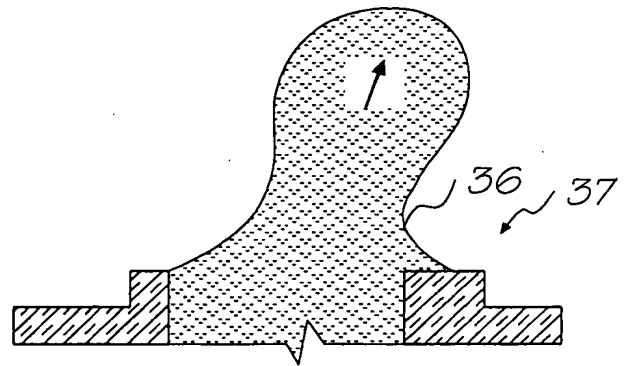


FIG. 9

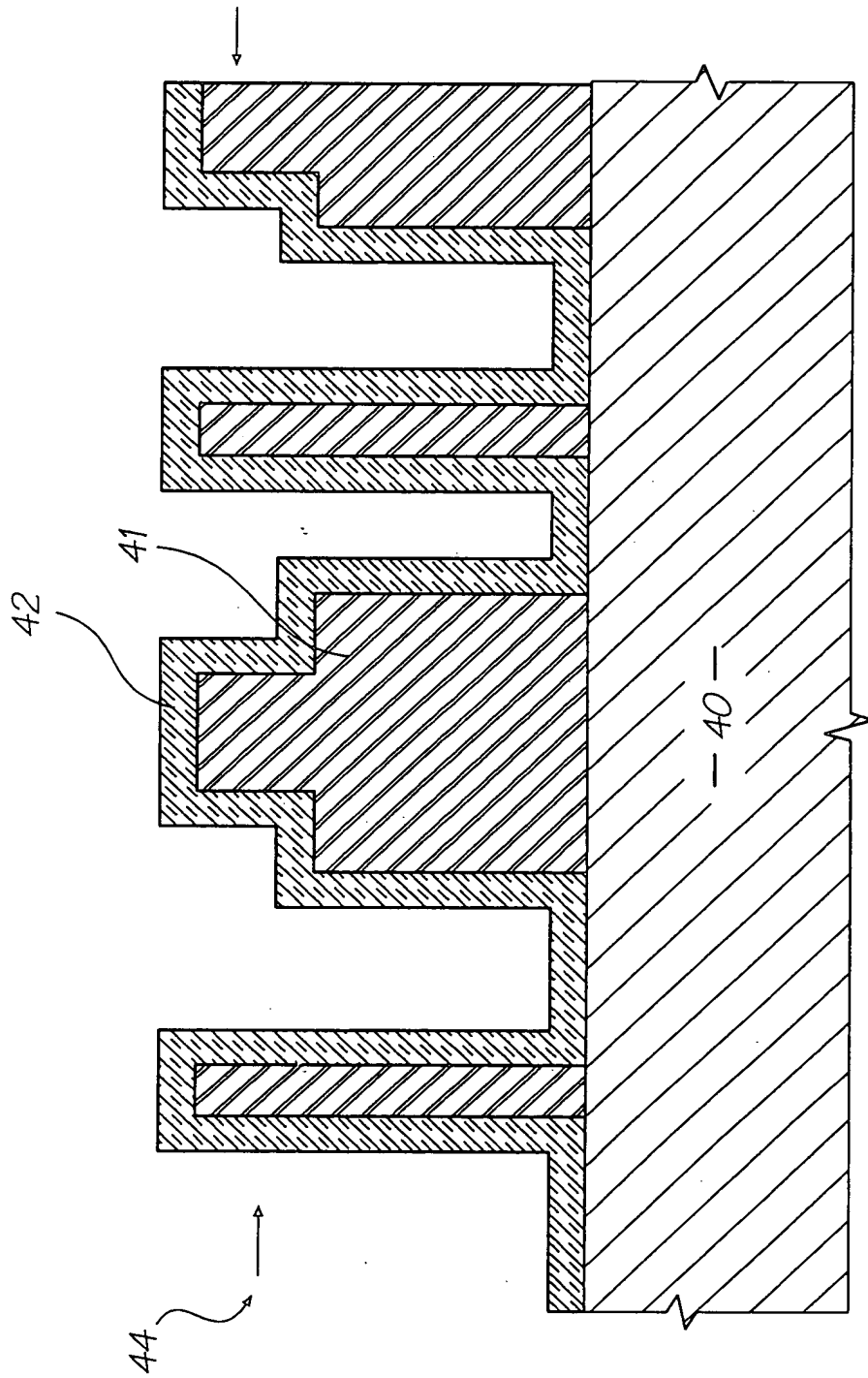


FIG. 10

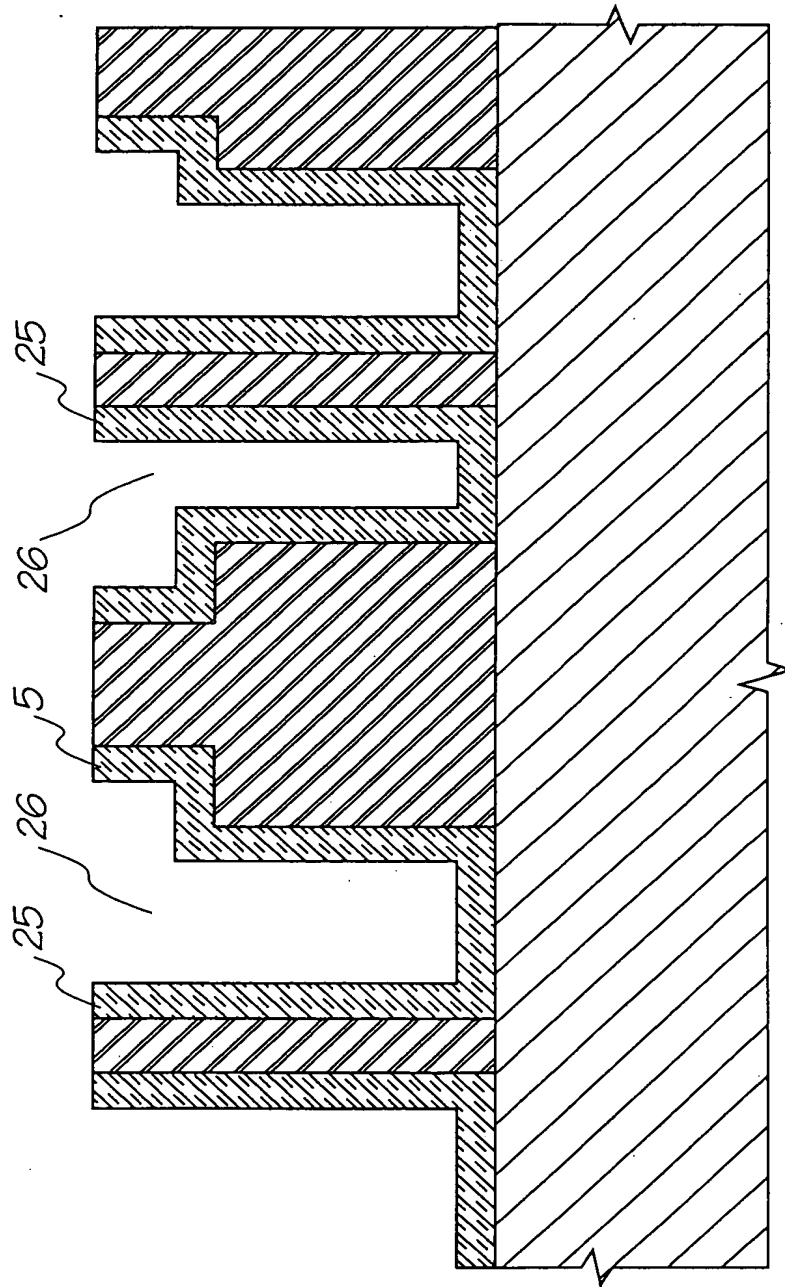


FIG. 11

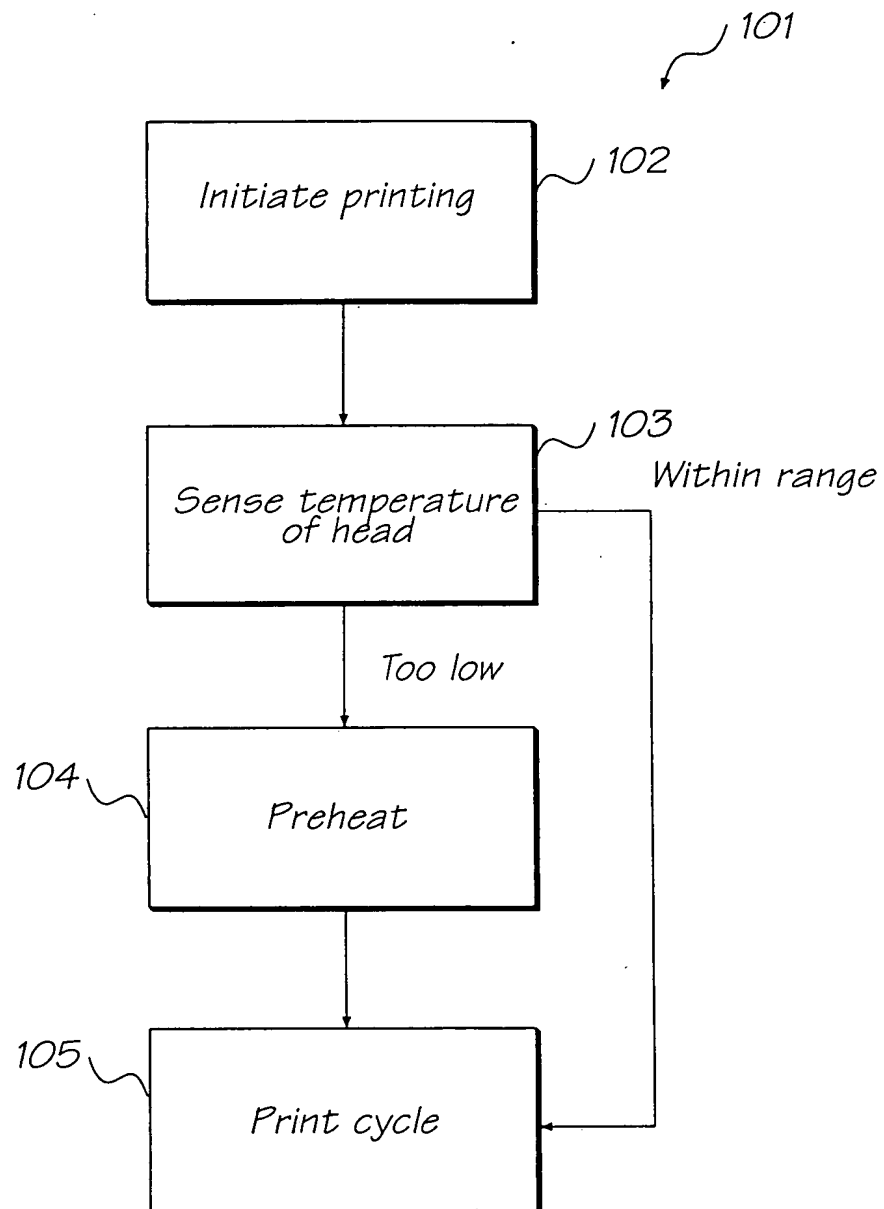


FIG. 12

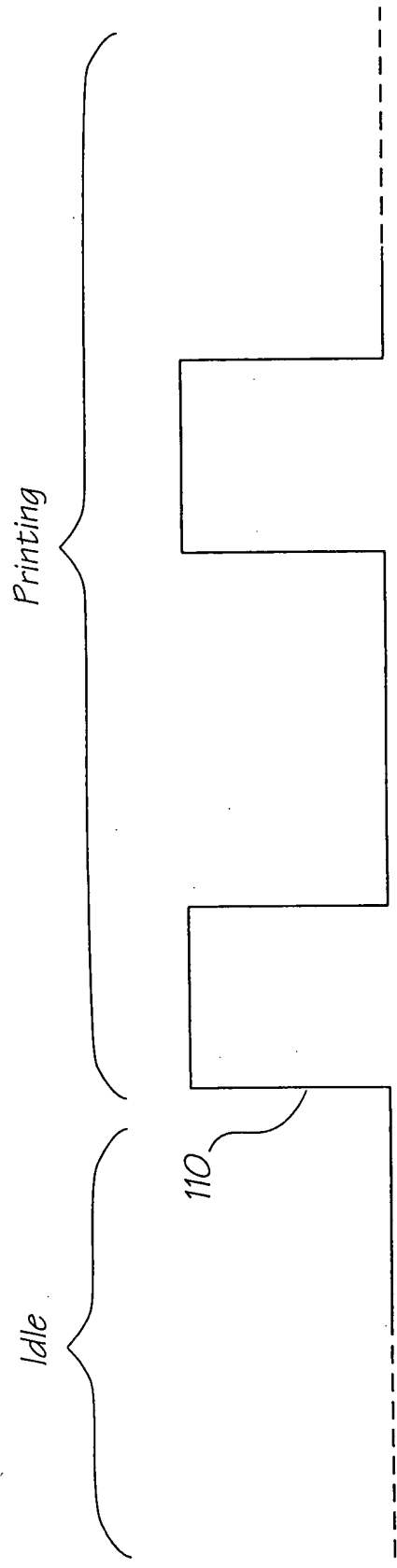


FIG. 13

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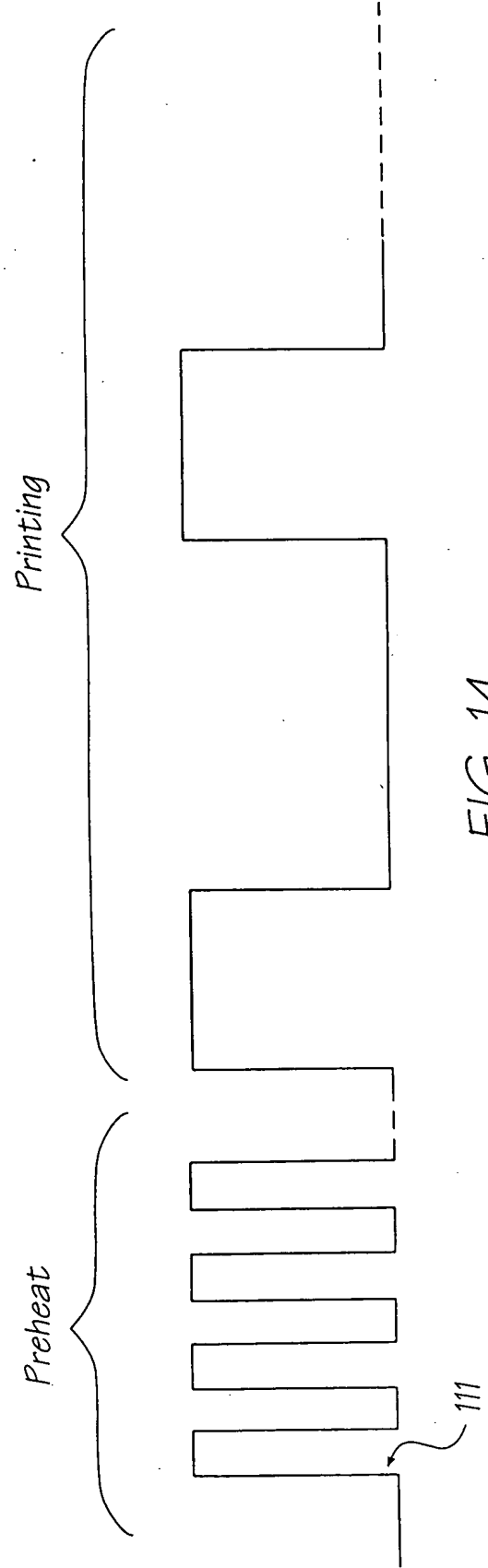


FIG. 14

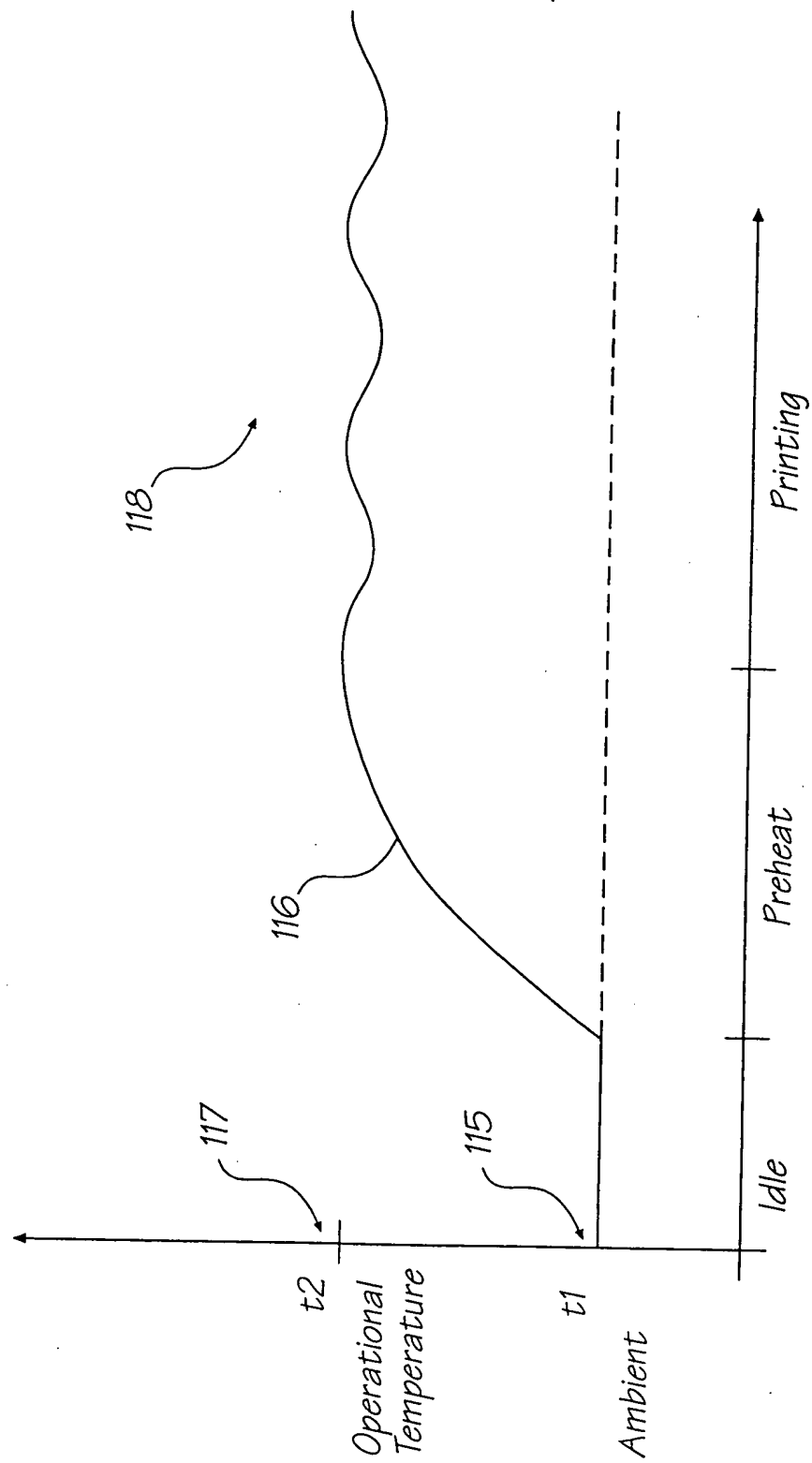


FIG. 15



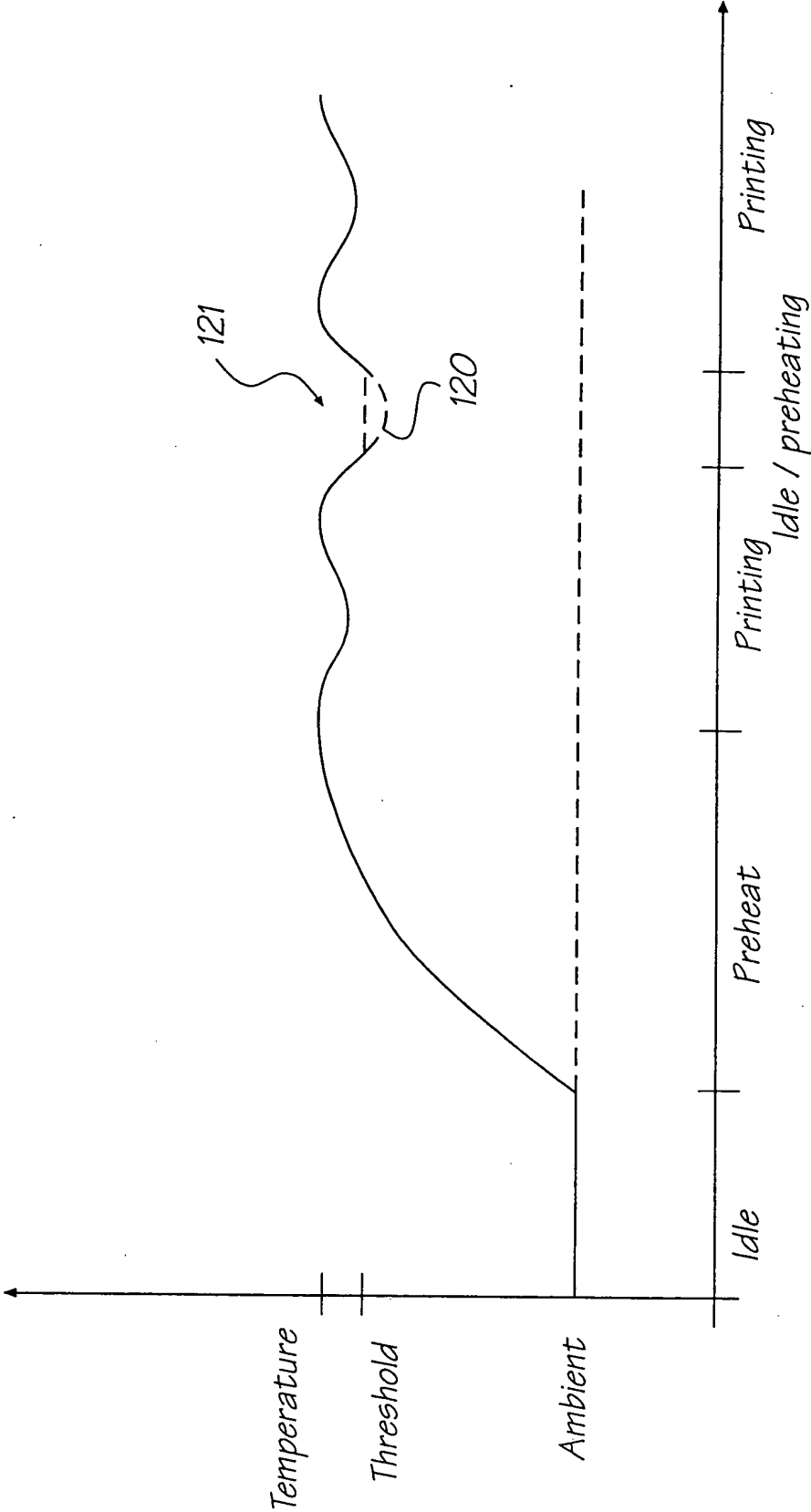


FIG. 16

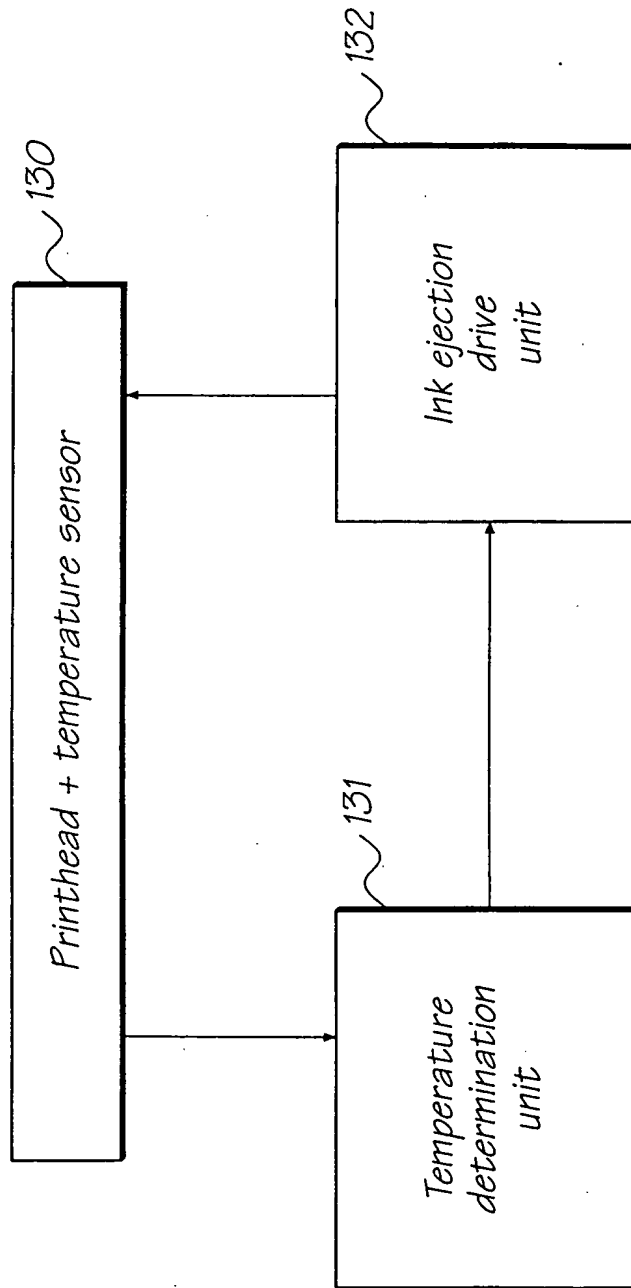


FIG. 17

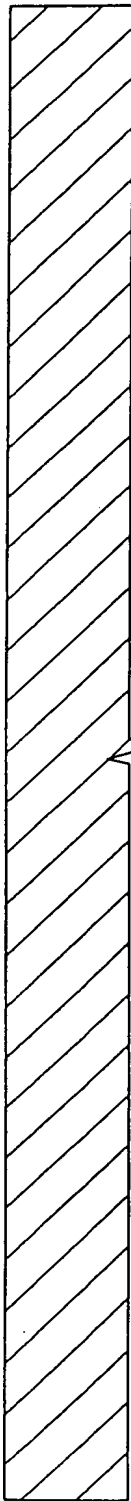
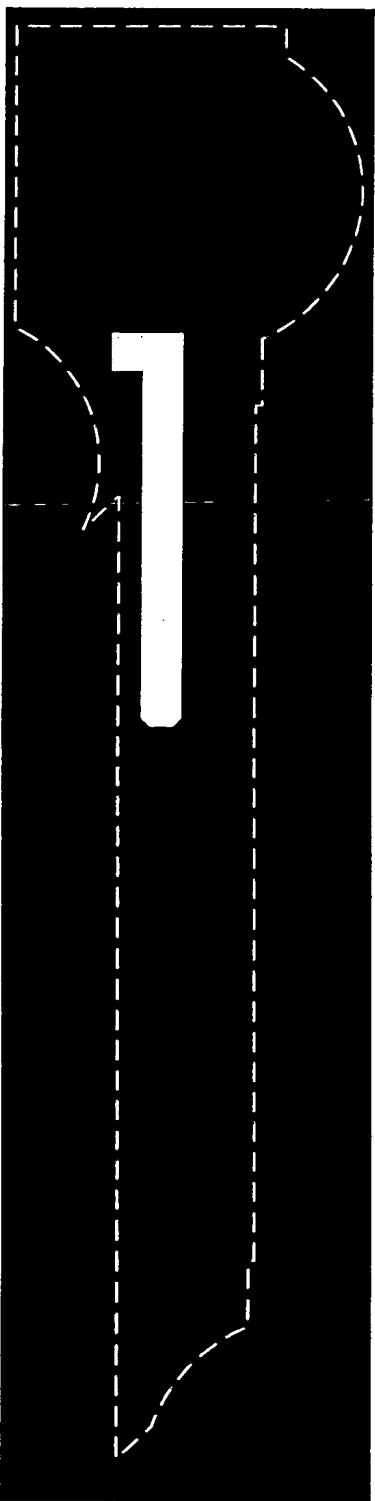


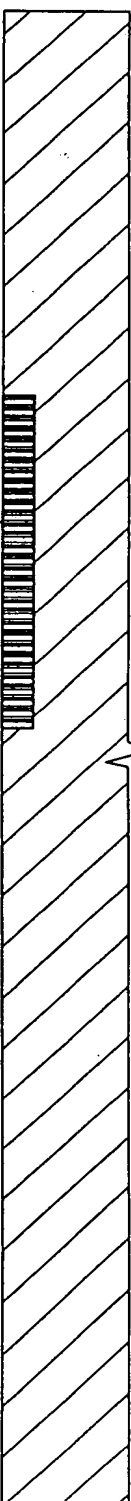
FIG. 18



N-Well mask

FIG. 19

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Implant N-Well

FIG. 20

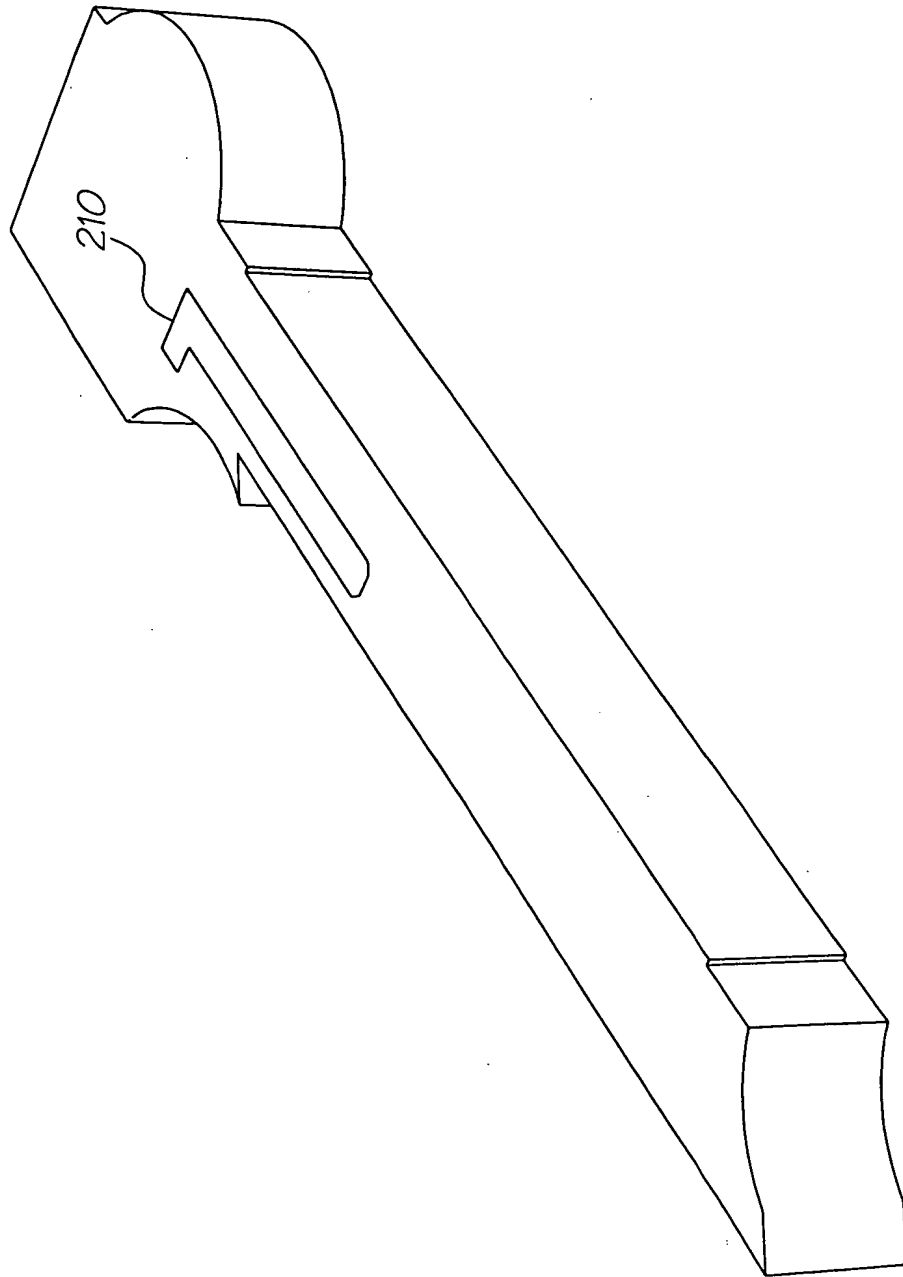
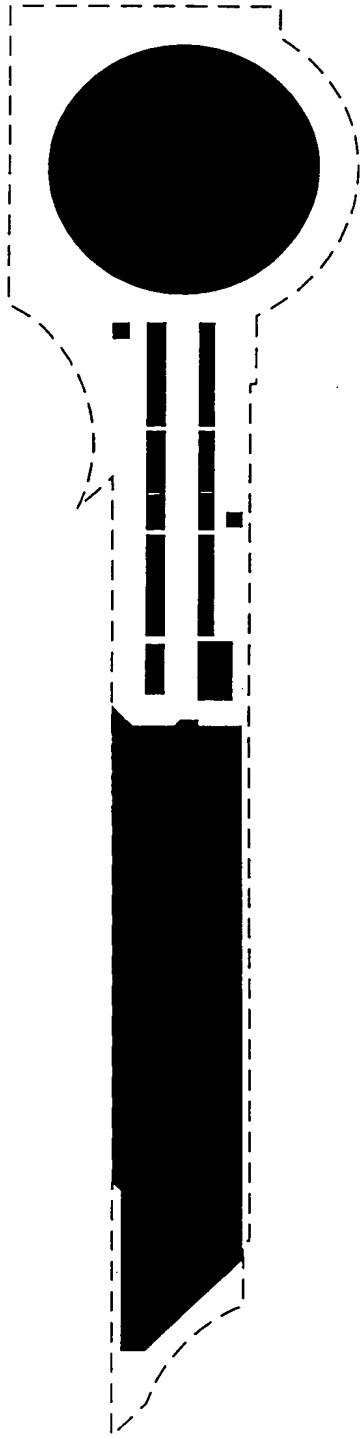
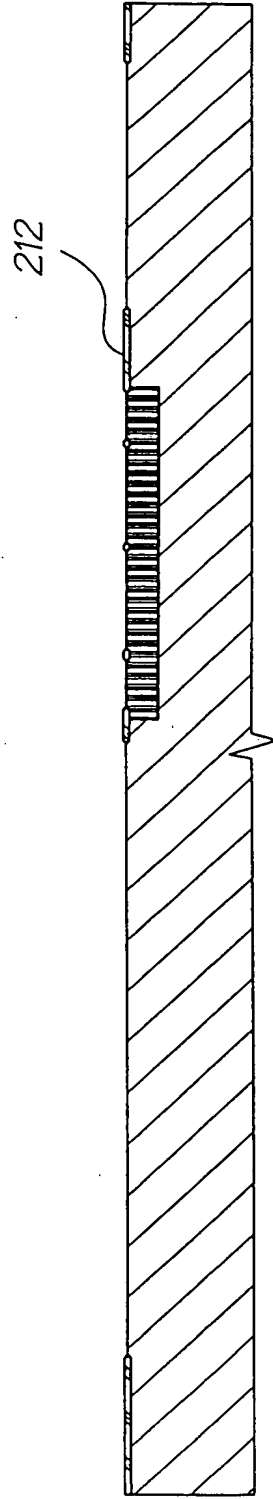


FIG. 21



Active mask

FIG. 22



Grow field oxide

FIG. 23

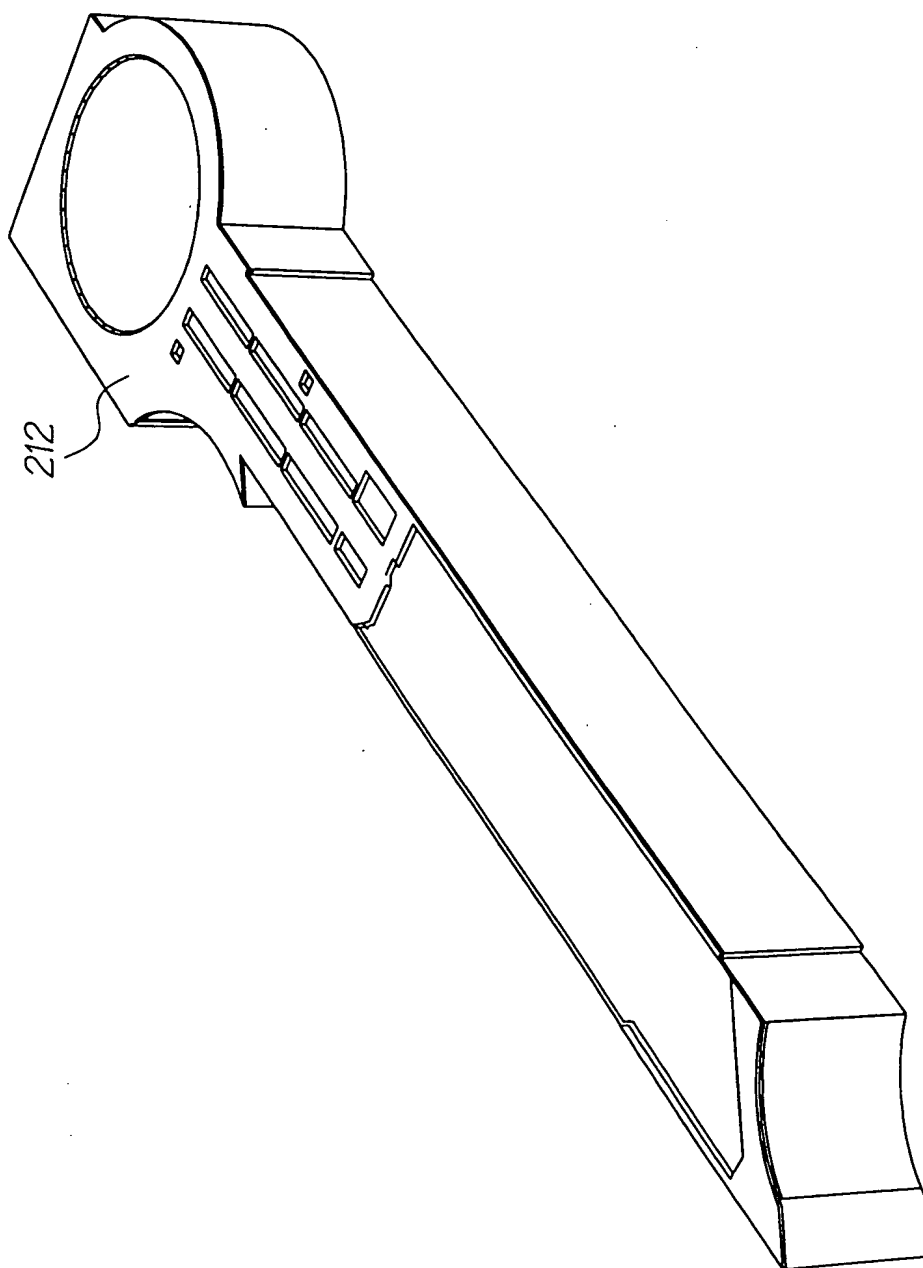
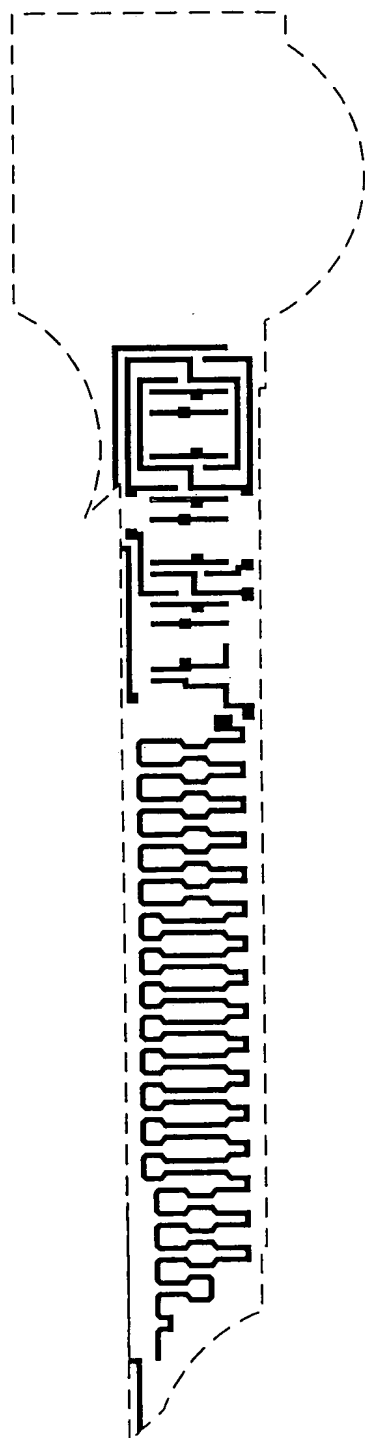
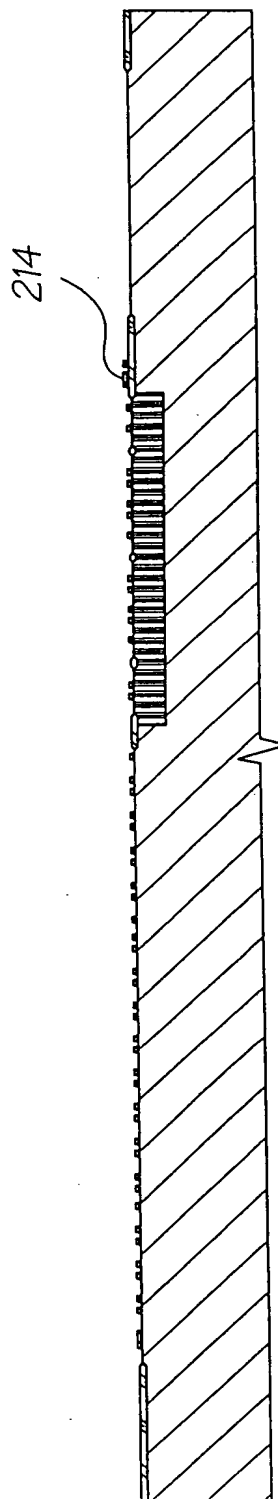


FIG. 24



*Poly mask*

*FIG. 25*



*Deposit poly*

*FIG. 26*

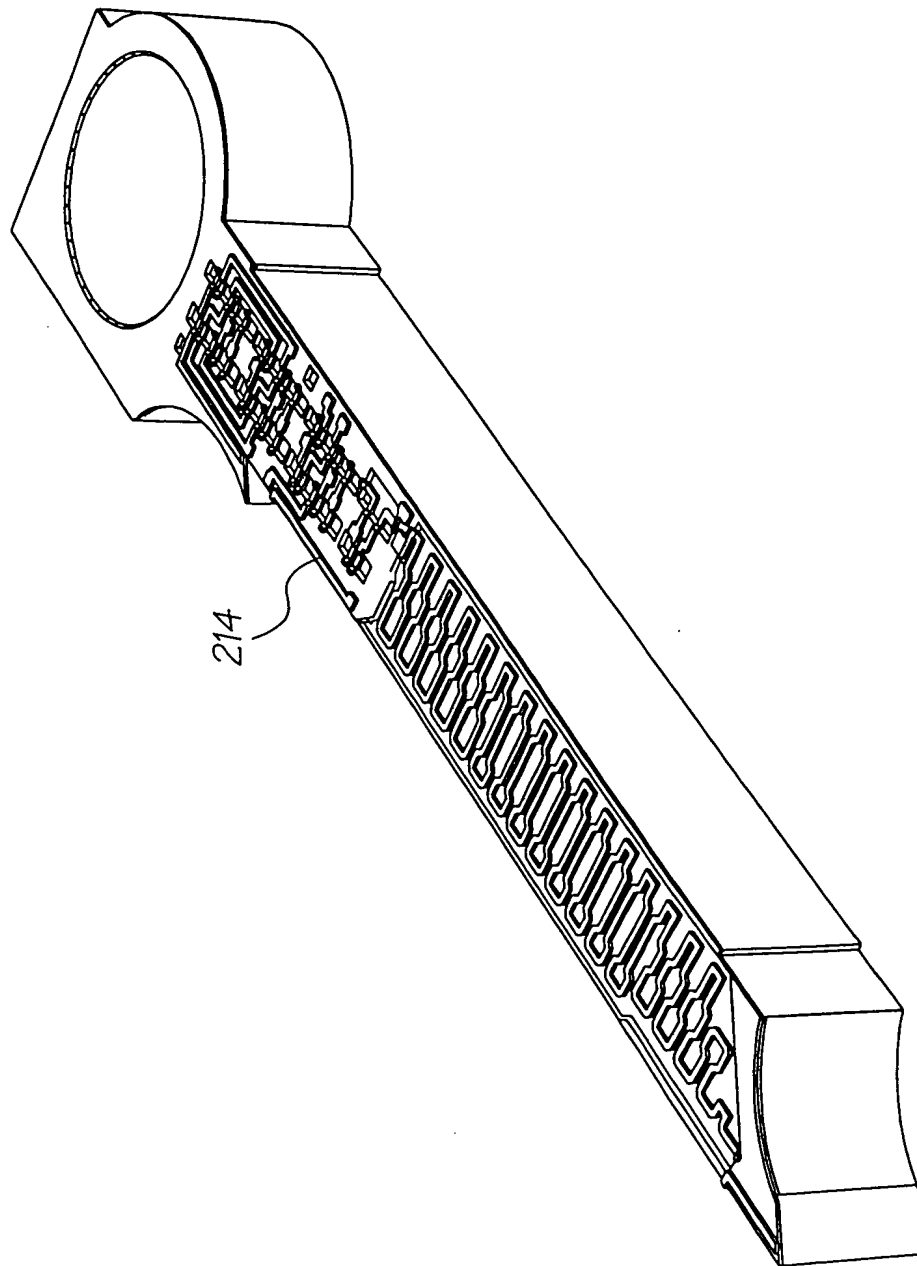
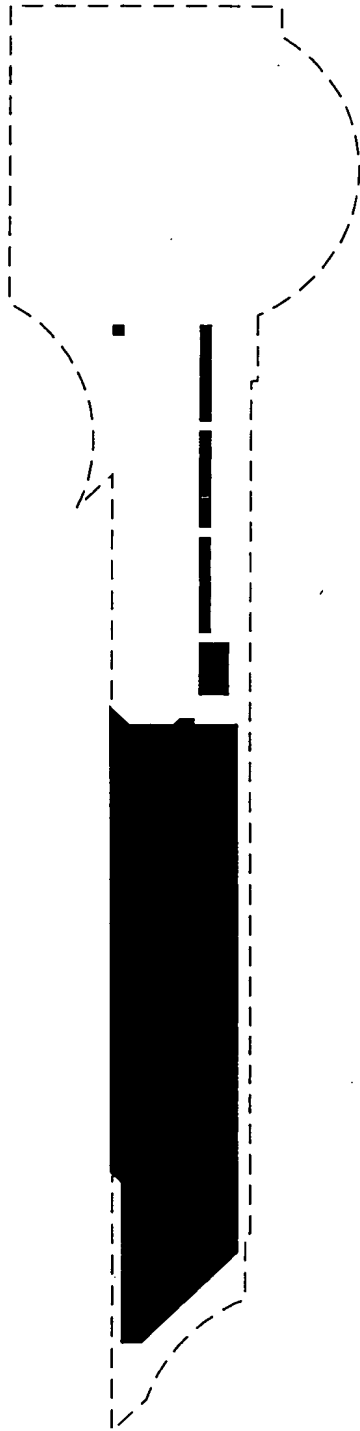


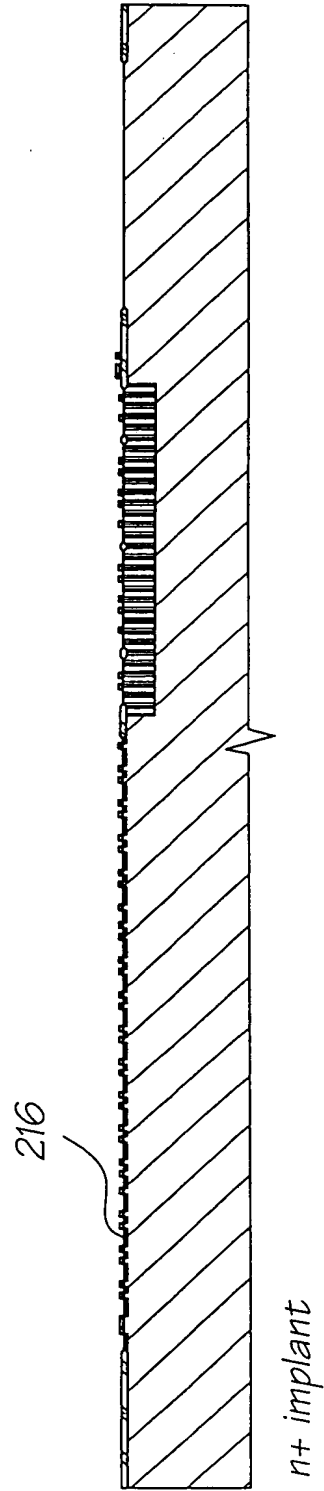
FIG. 27





*n+* mask

FIG. 28



*n+* implant

FIG. 29

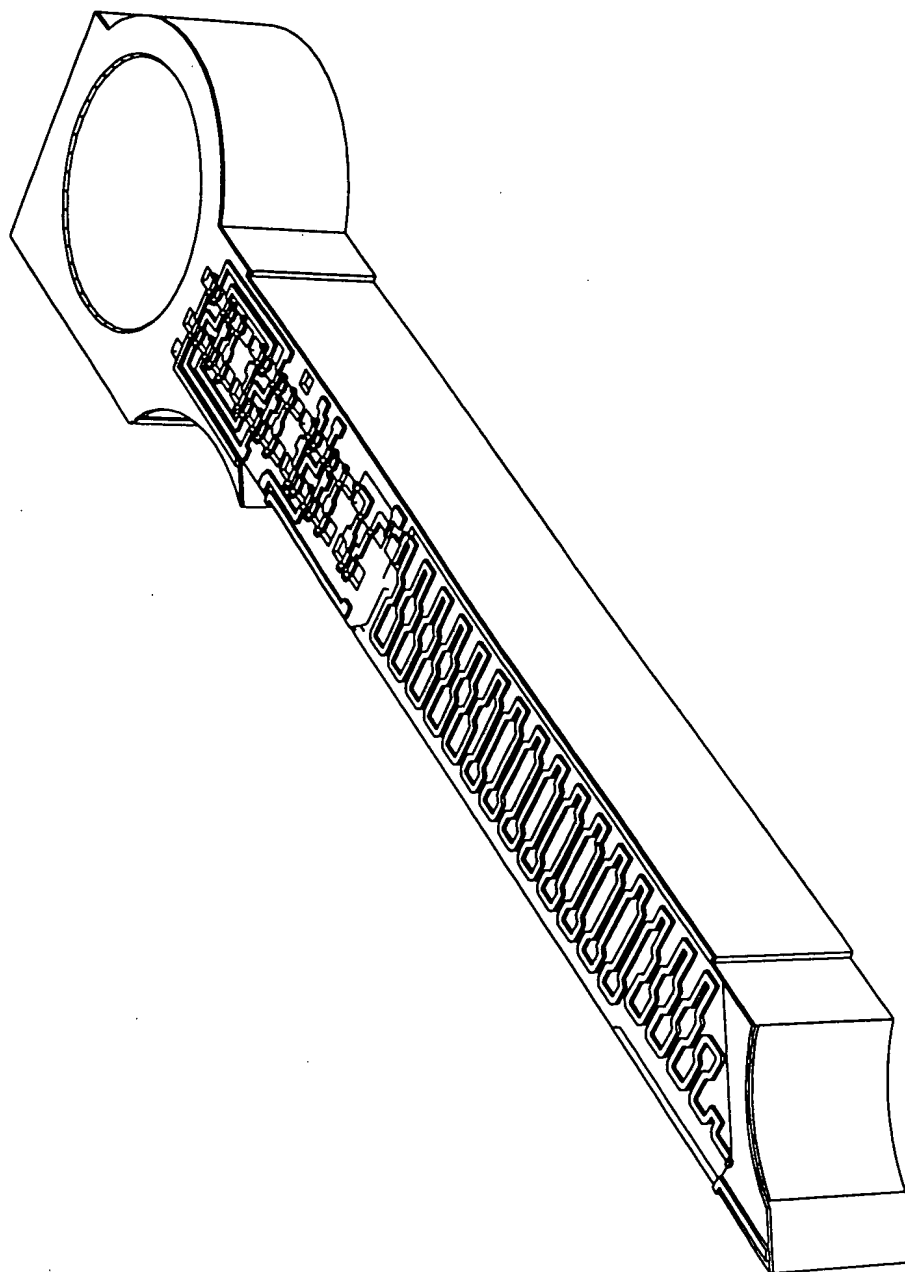


FIG. 30

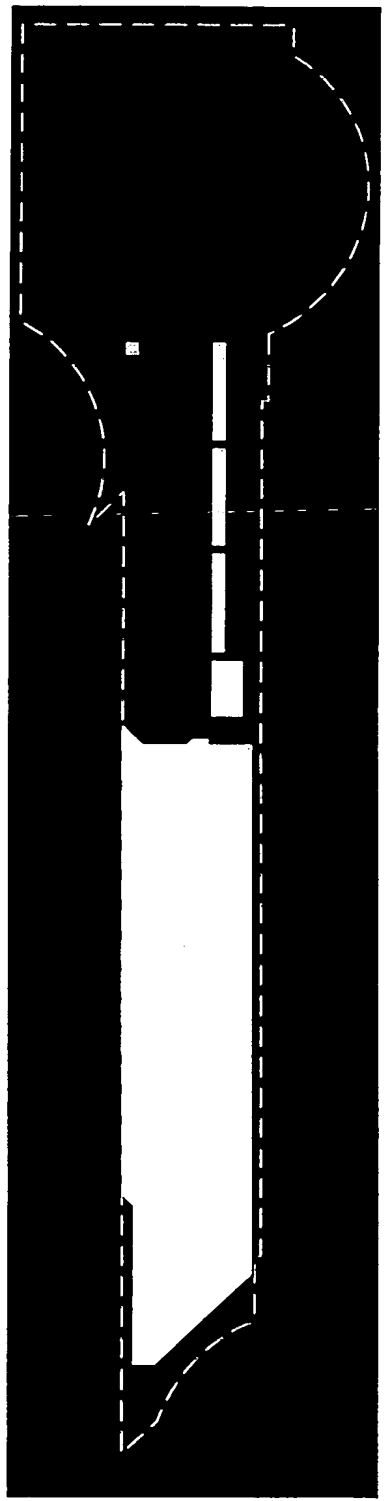


FIG. 31

p+ mask

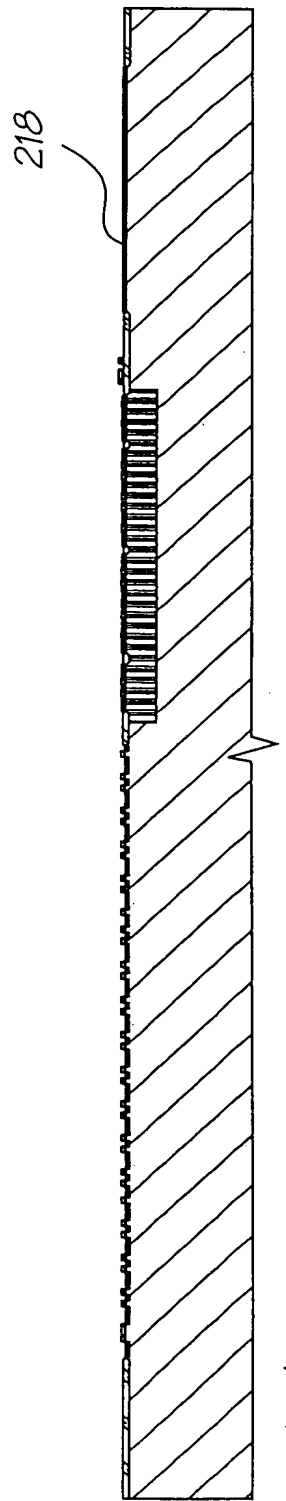


FIG. 32

p+ implant

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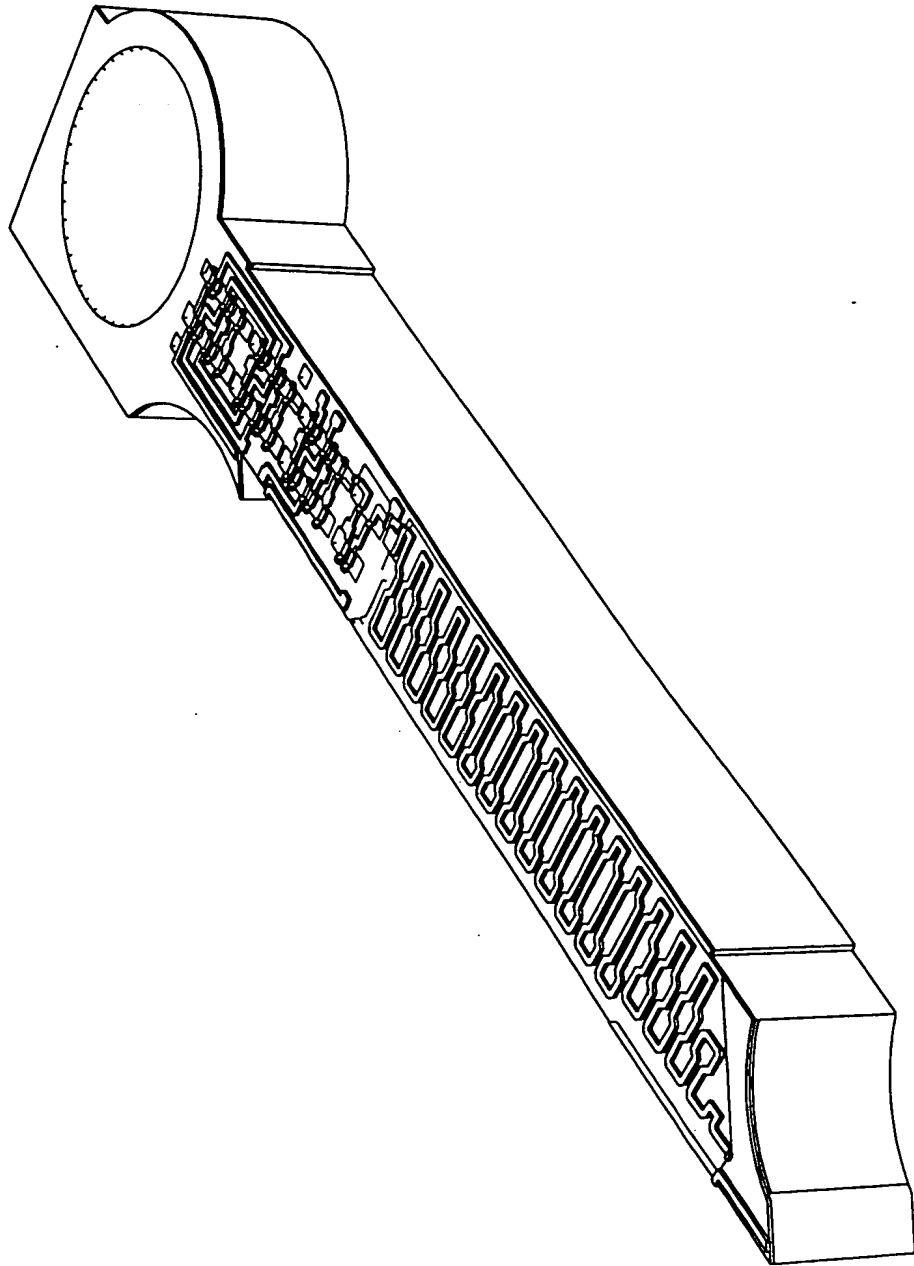
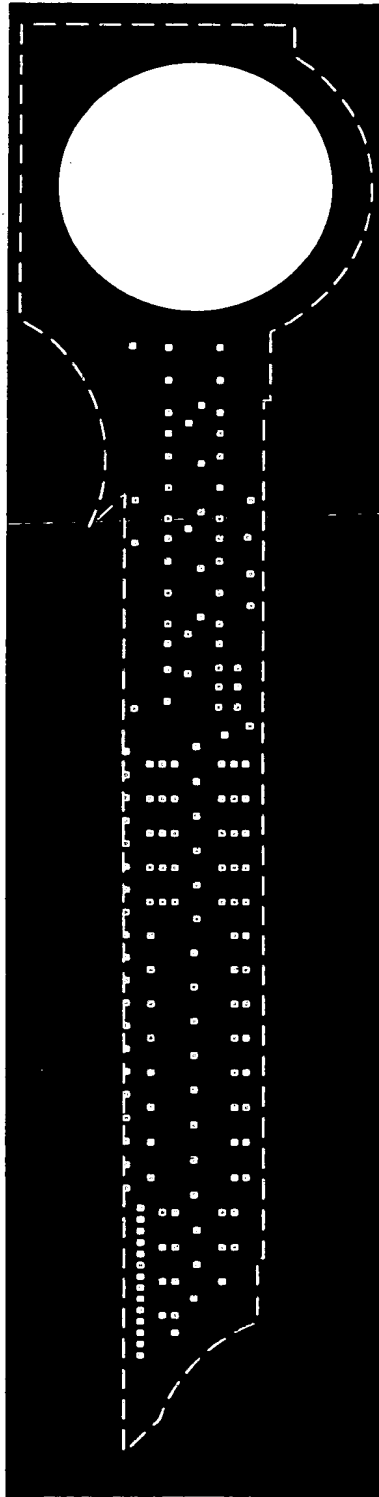
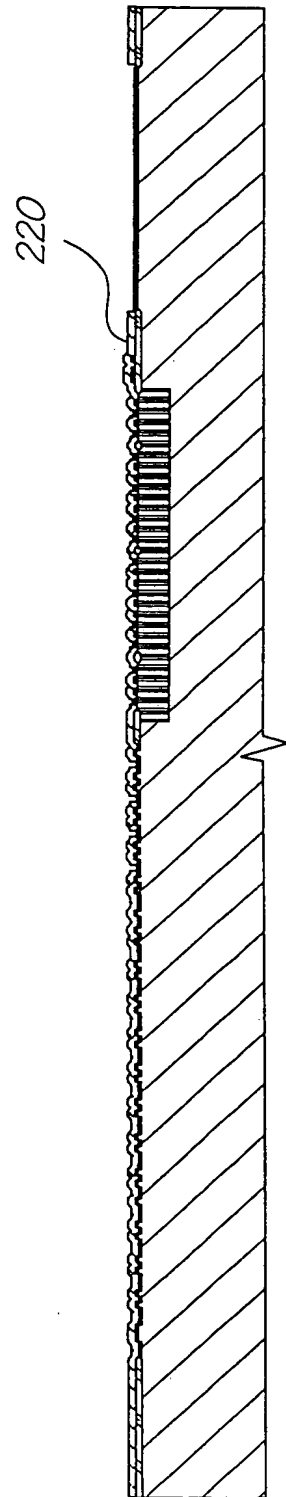


FIG. 33



*Contacts mask*

*FIG. 34*



*Deposit ILD 1, etch contacts*

*FIG. 35*

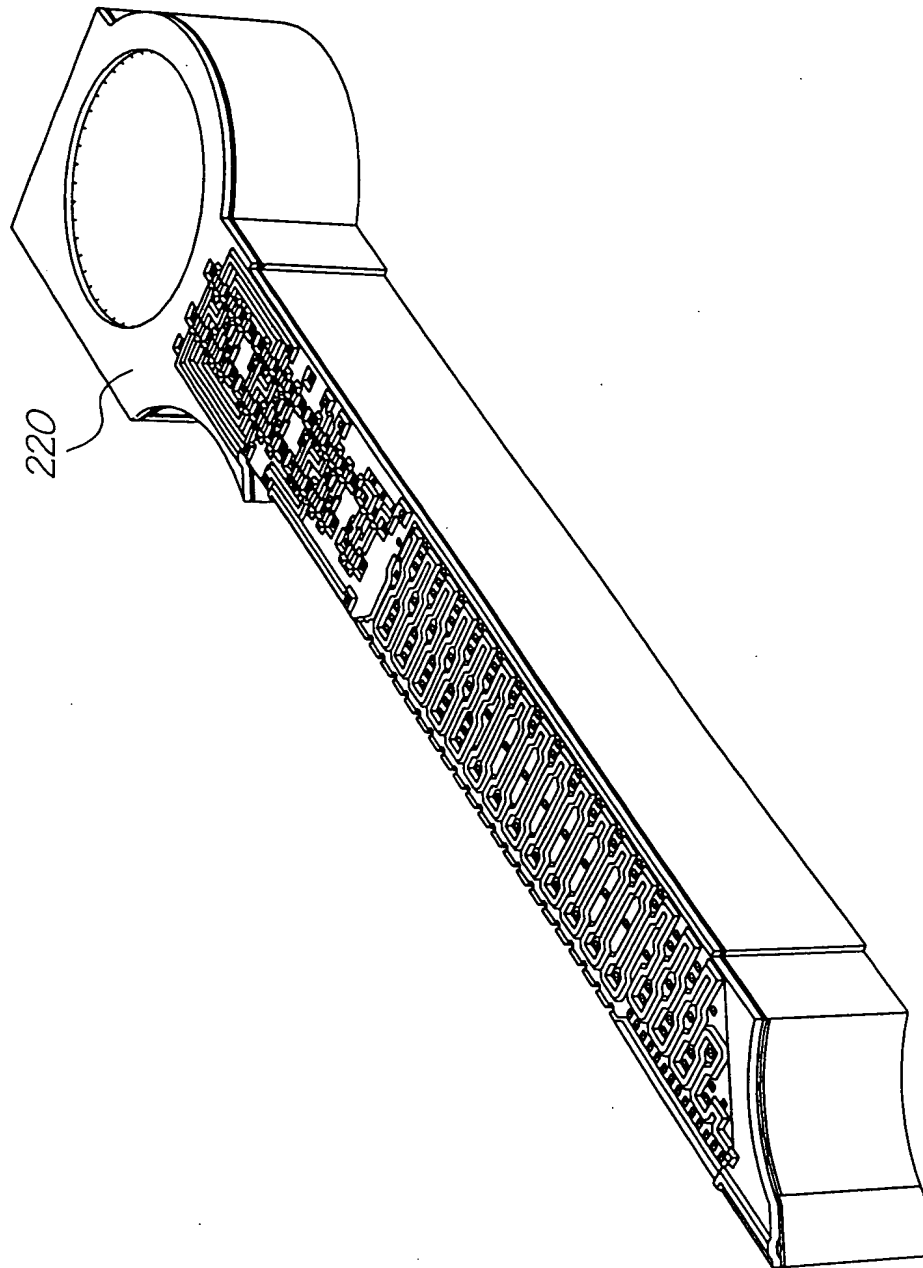
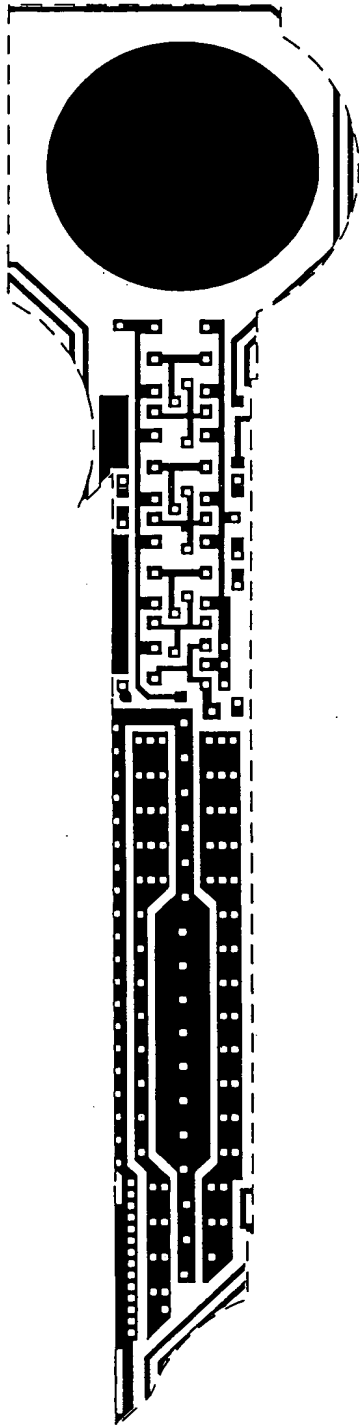
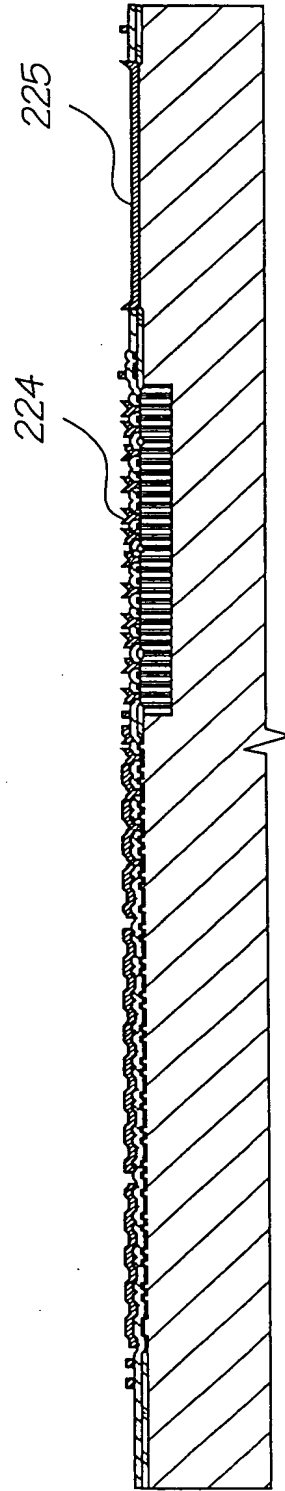


FIG. 36



Metal 1 mask

FIG. 37



Deposit Metal 1

FIG. 38

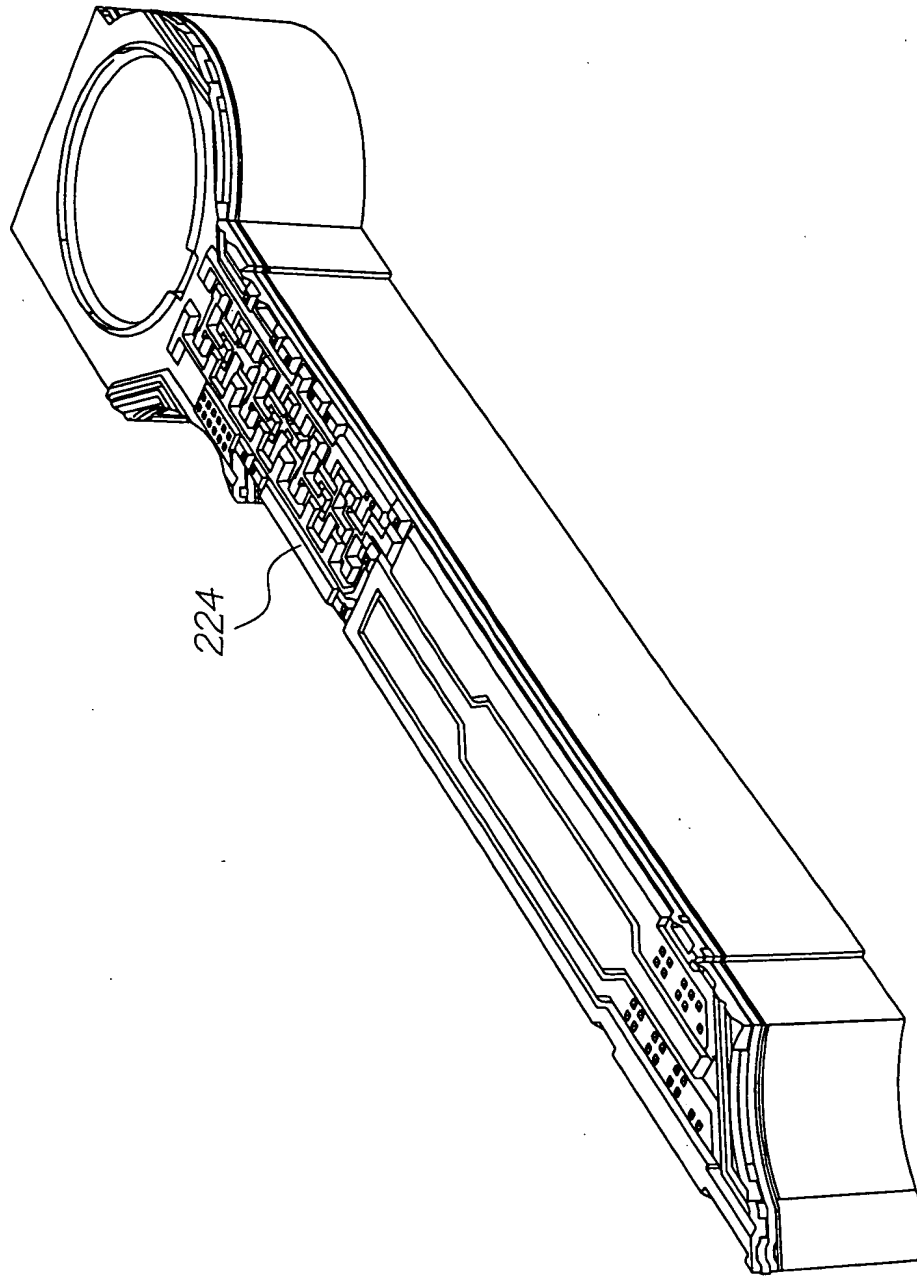
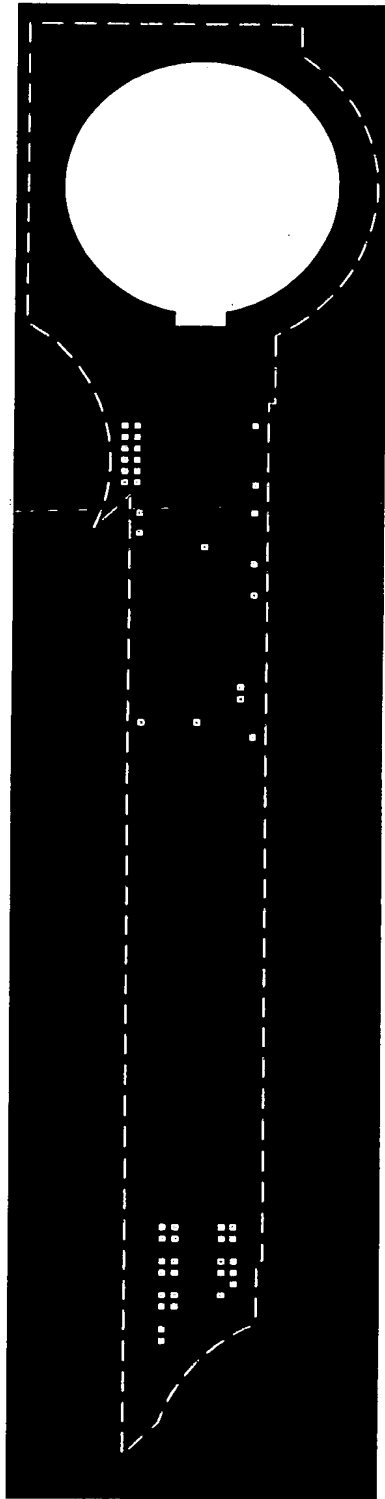


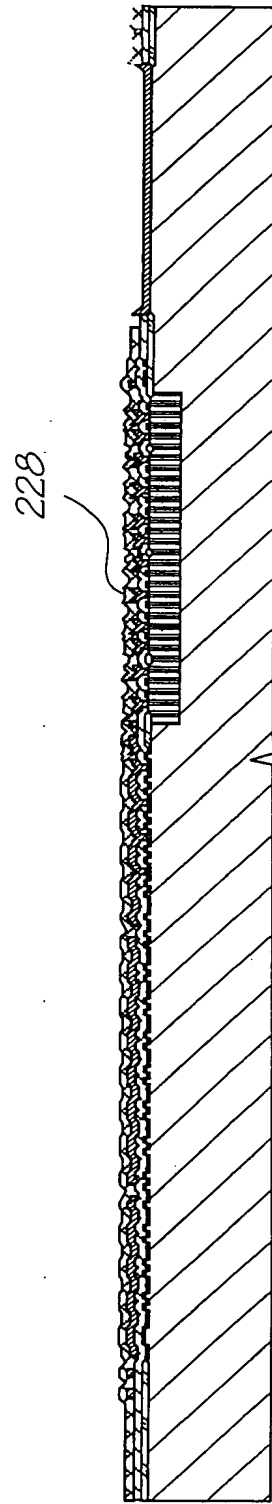
FIG. 39





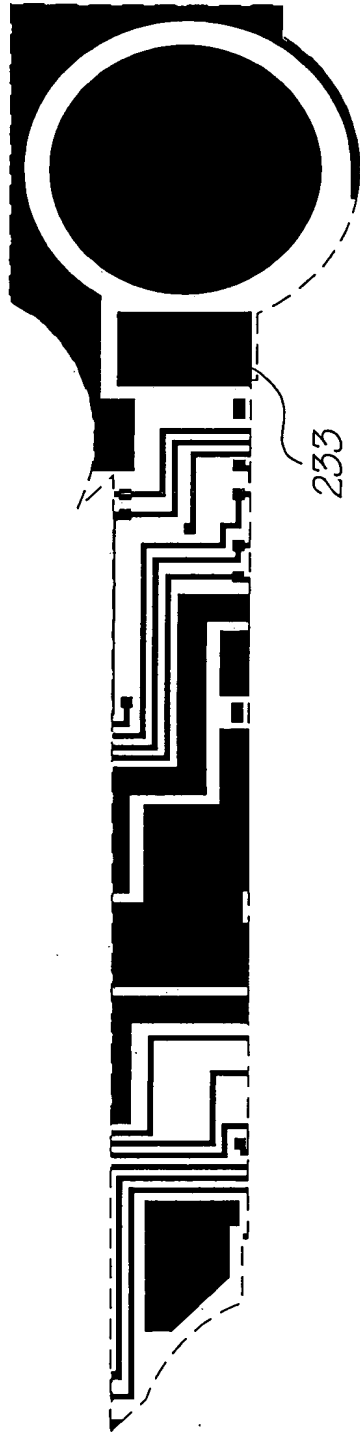
Via 1 mask

FIG. 40



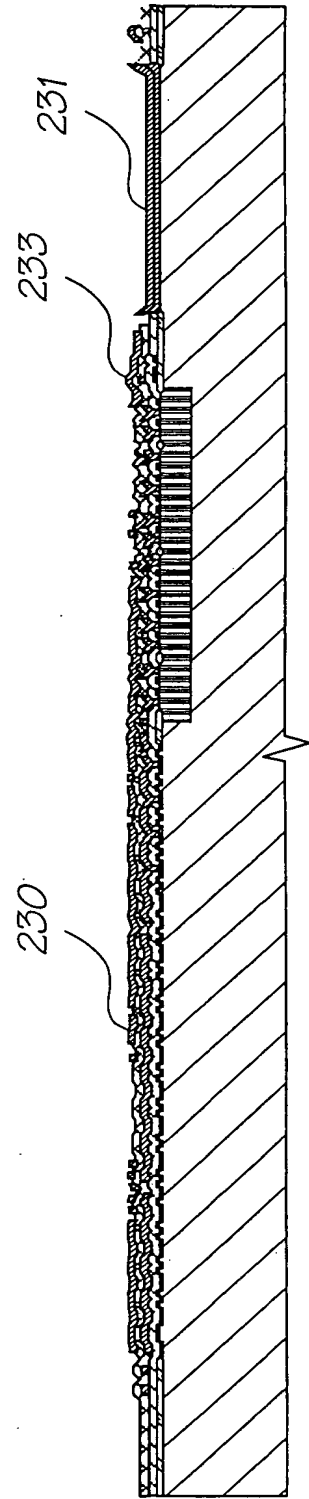
Deposit ILD 2, etch vias

FIG. 41



Metal 2 mask

FIG. 42



Deposit metal 2

FIG. 43

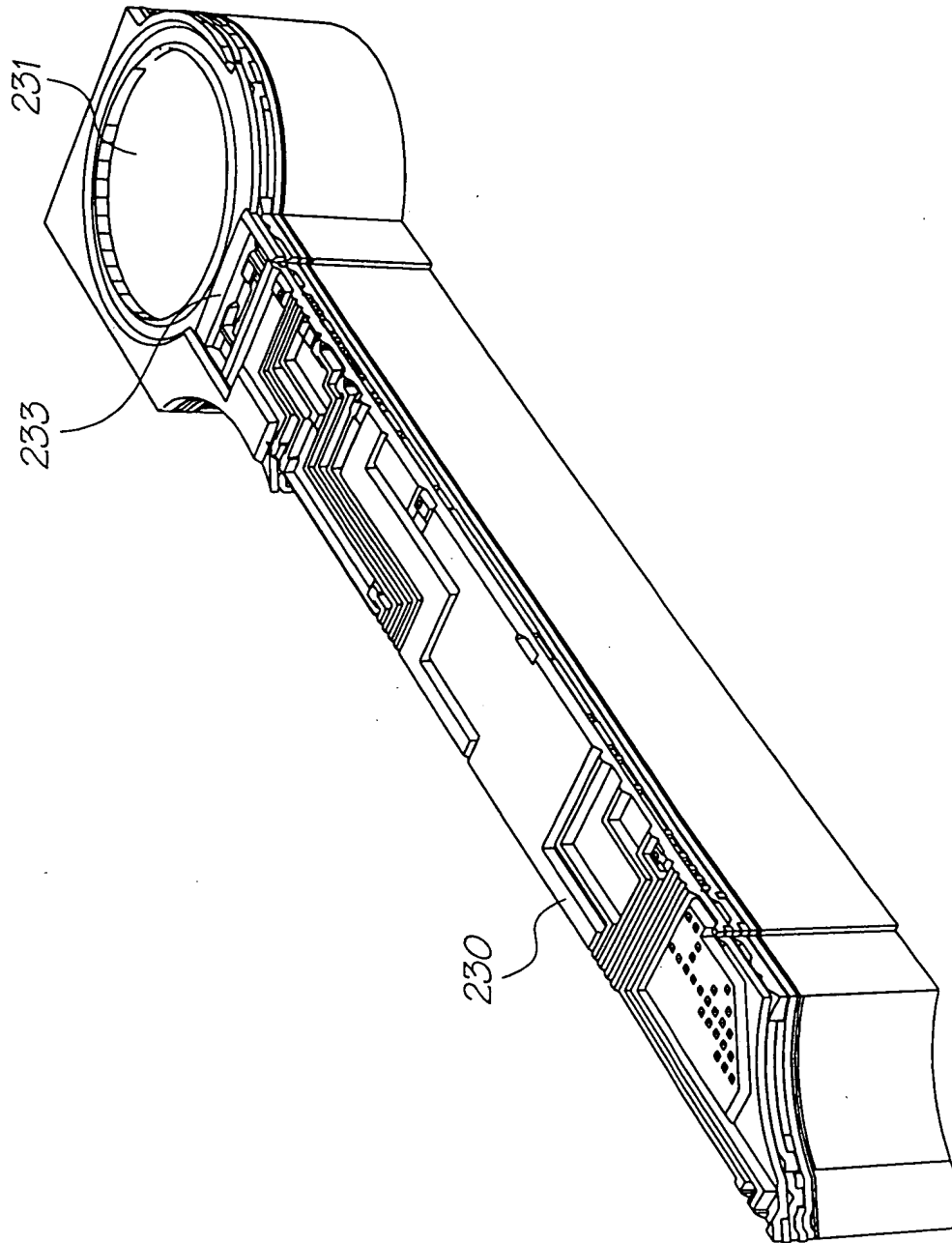


FIG. 44

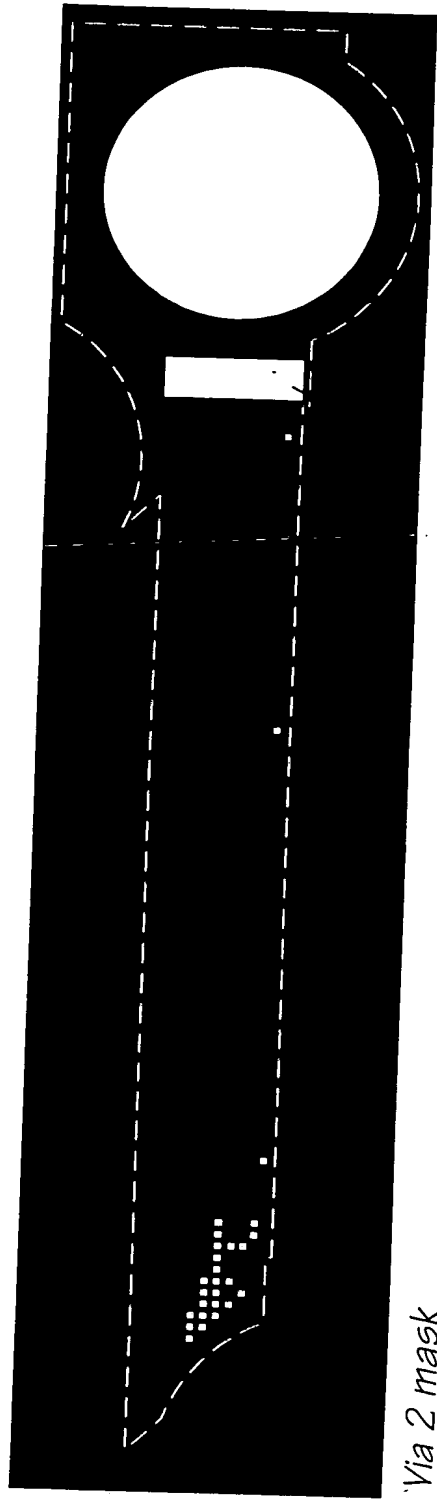


FIG. 45

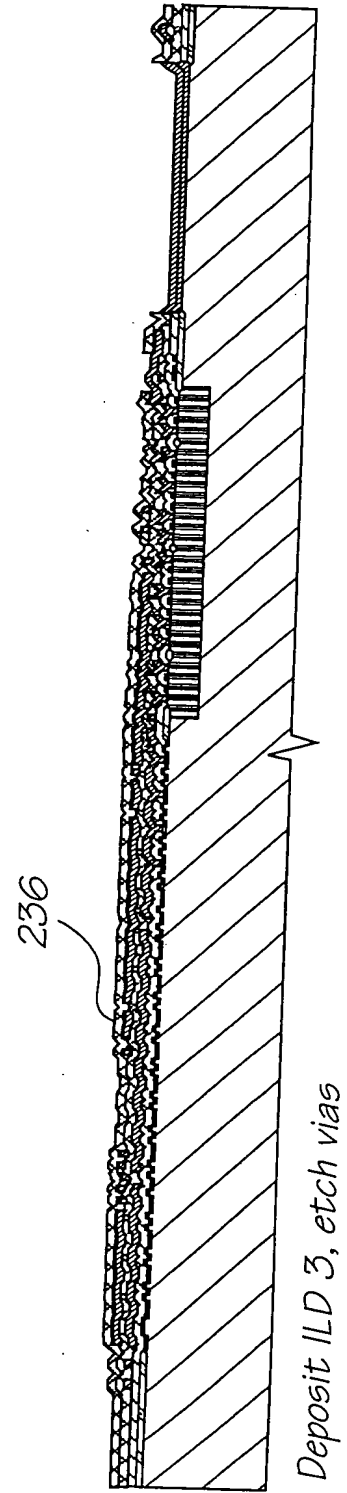
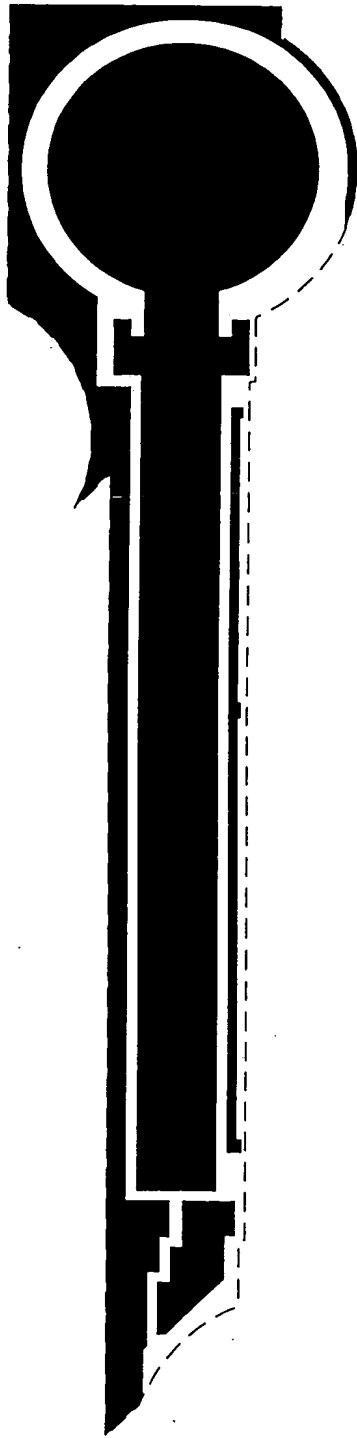
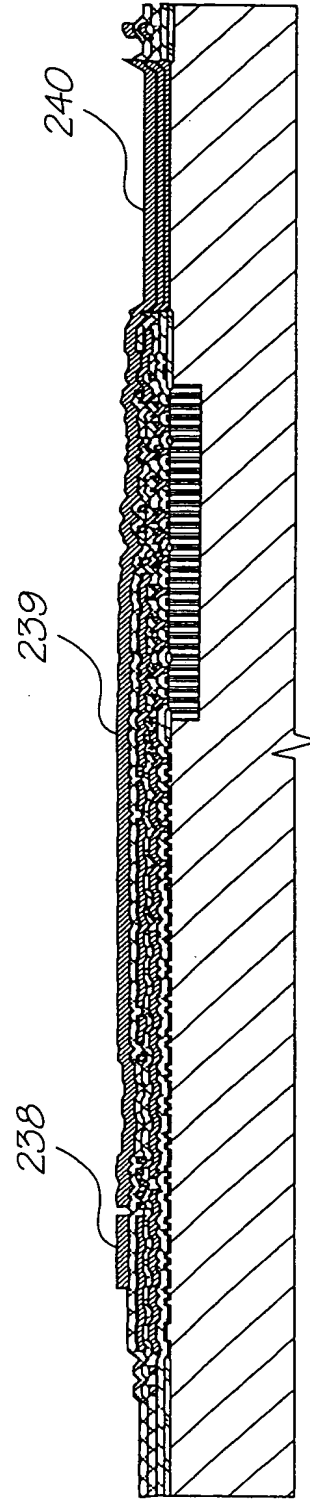


FIG. 46



Metal 3 mask

FIG. 47



Deposit metal 3

FIG. 48

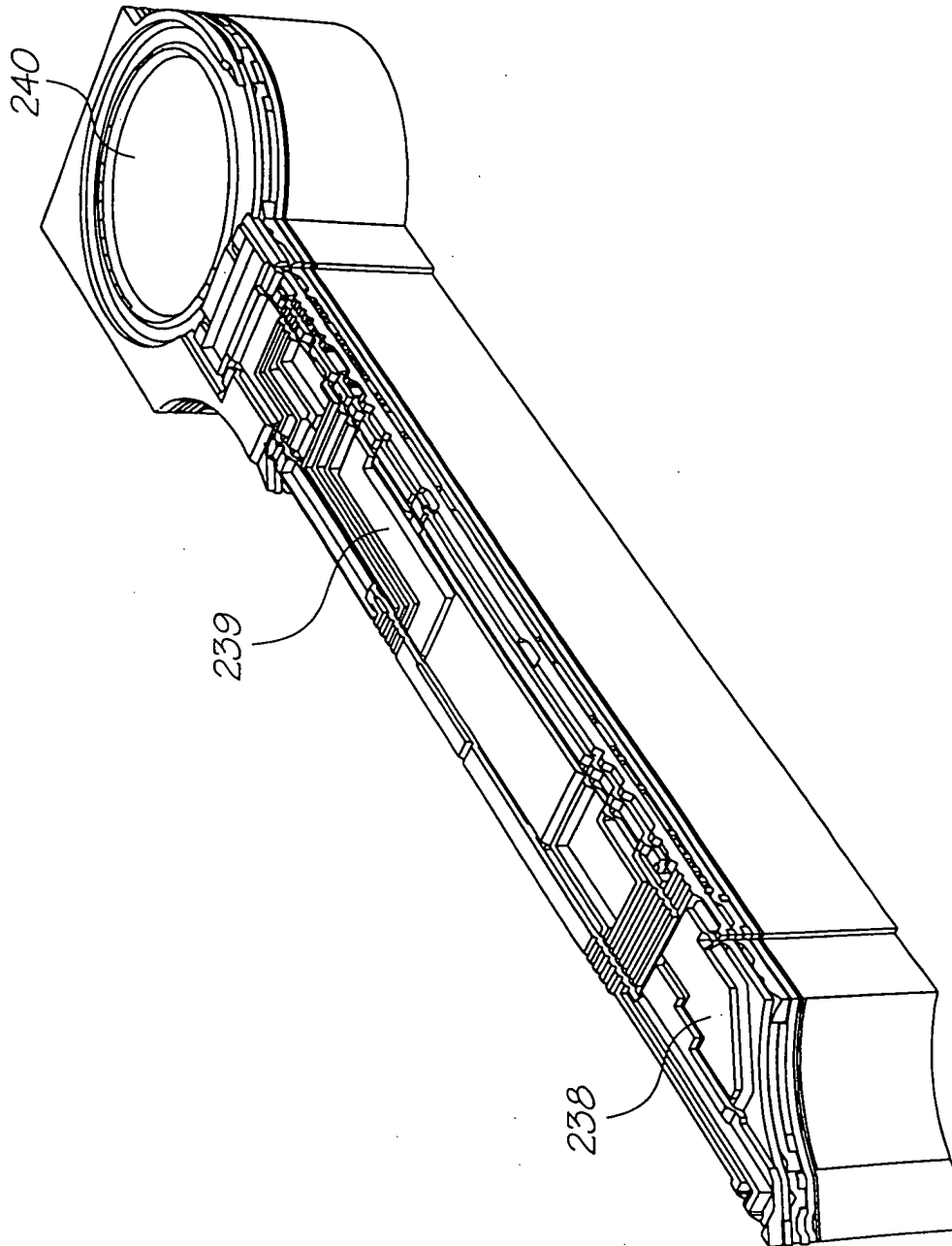
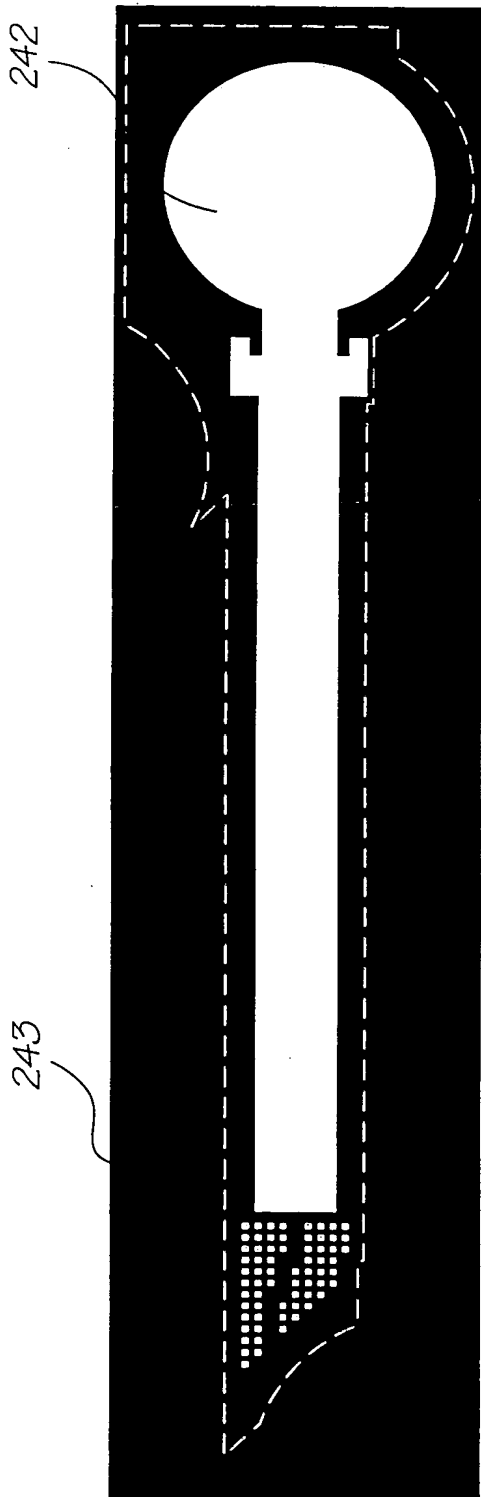
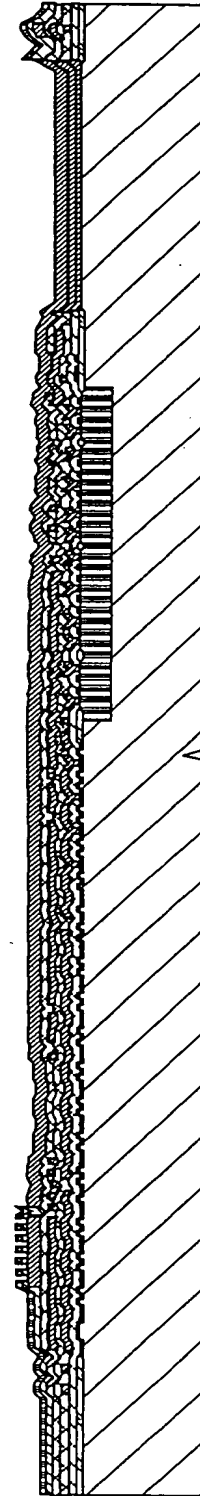


FIG. 49



Via 3 / Passivation mask

FIG. 50



Deposit passivation oxide & nitride, etch vias

FIG. 51

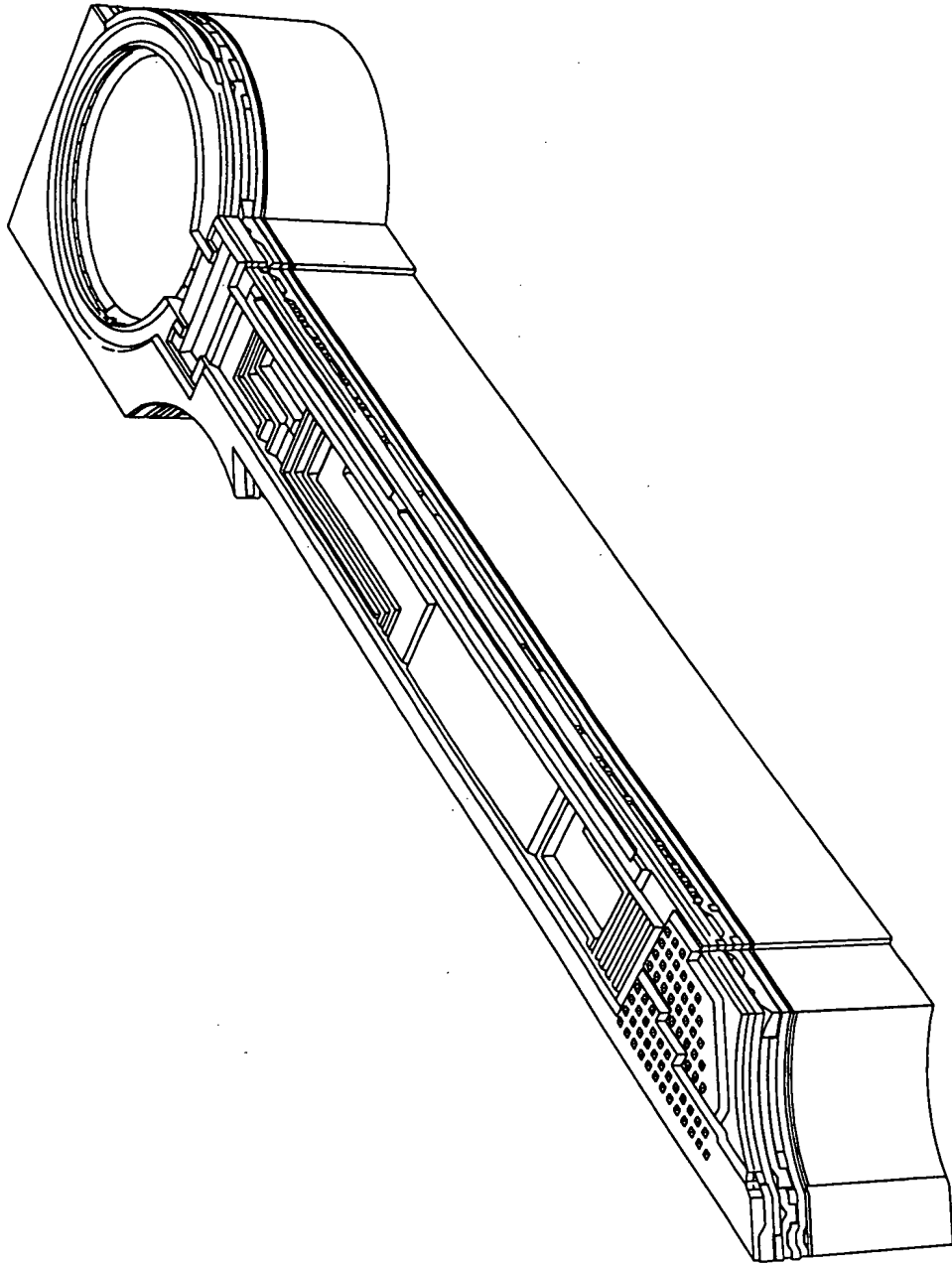
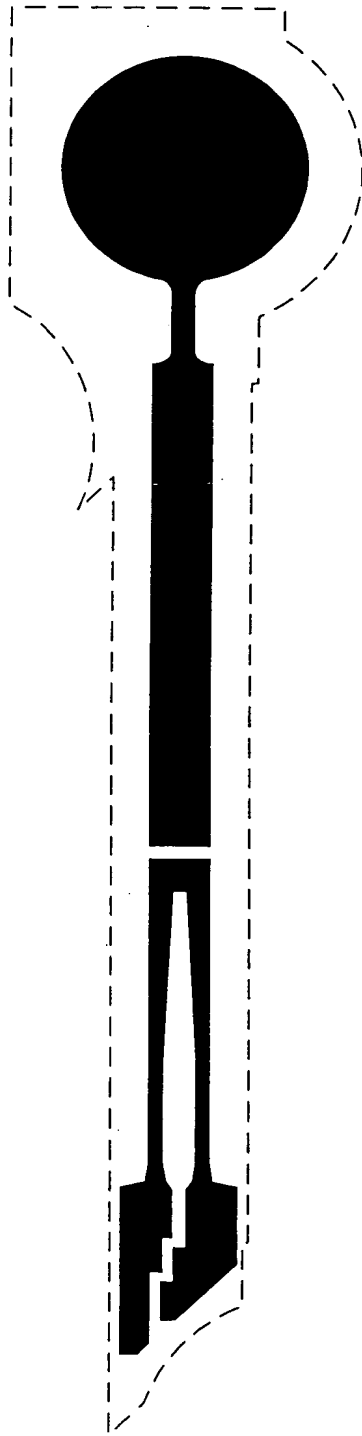


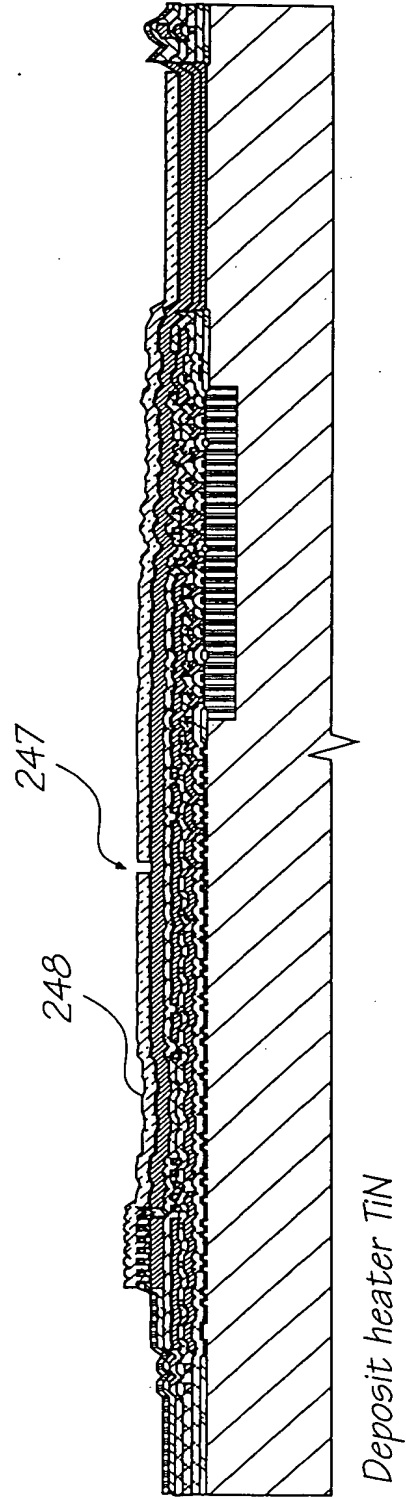
FIG. 52





Heater mask

FIG. 53



Deposit heater TiN

FIG. 54

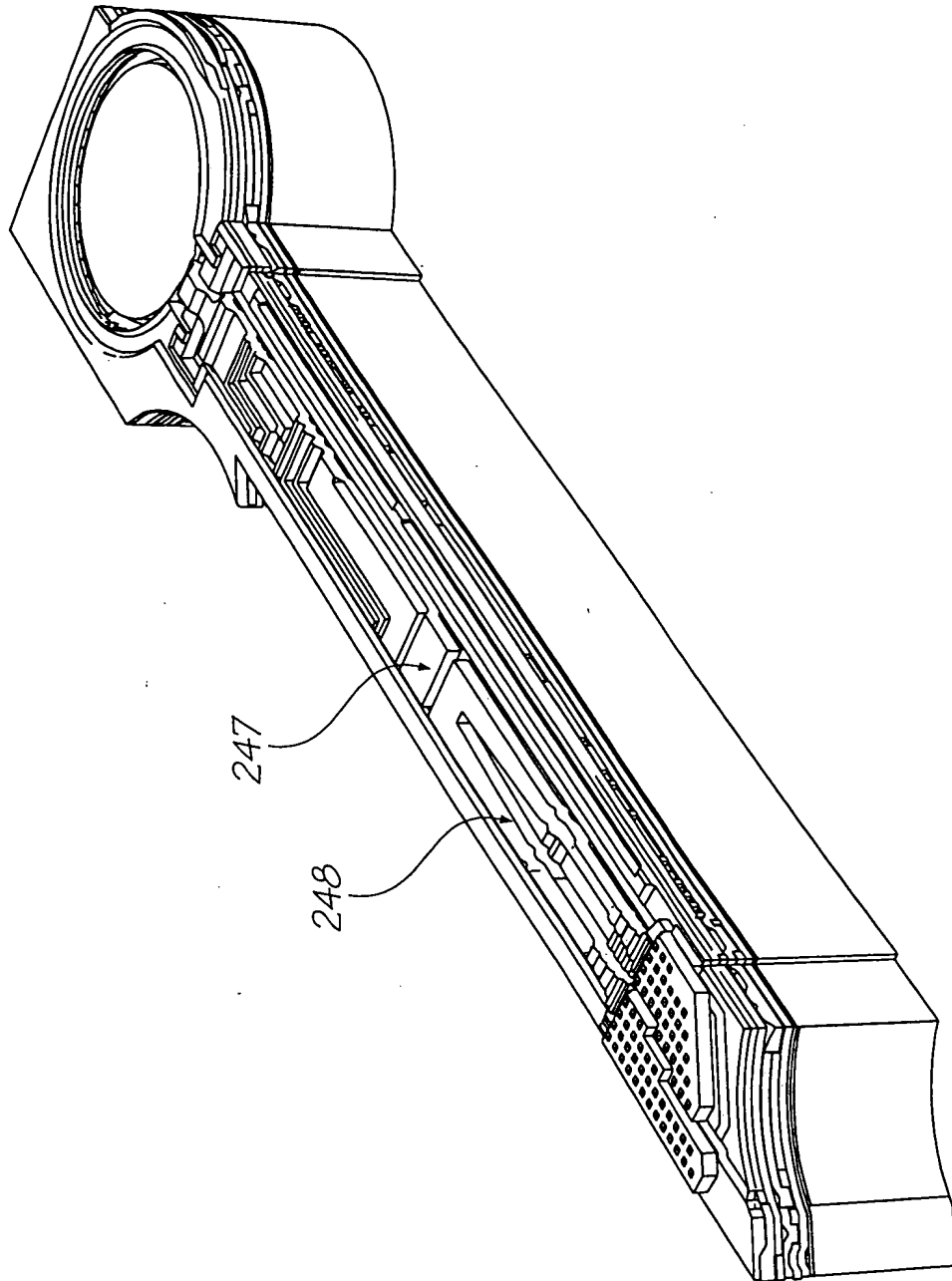
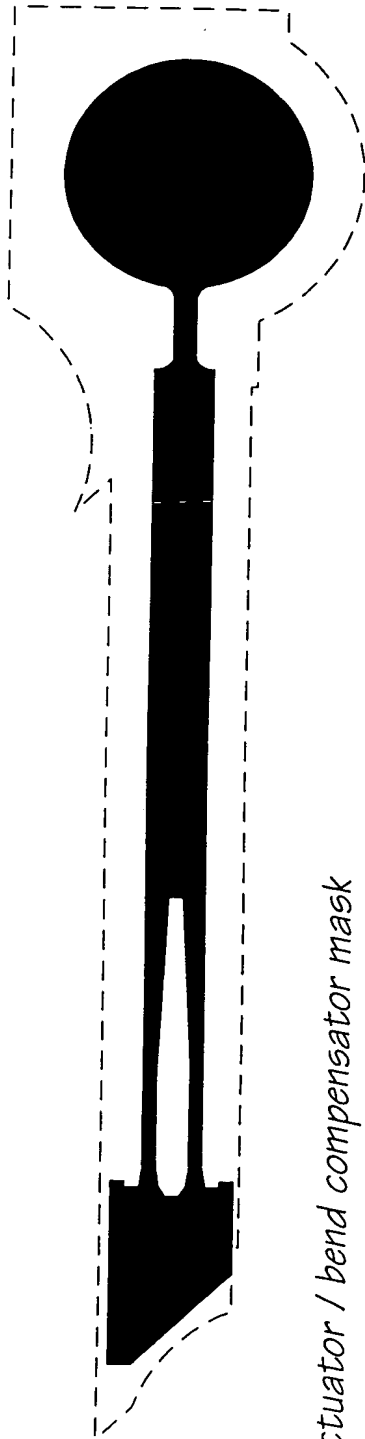
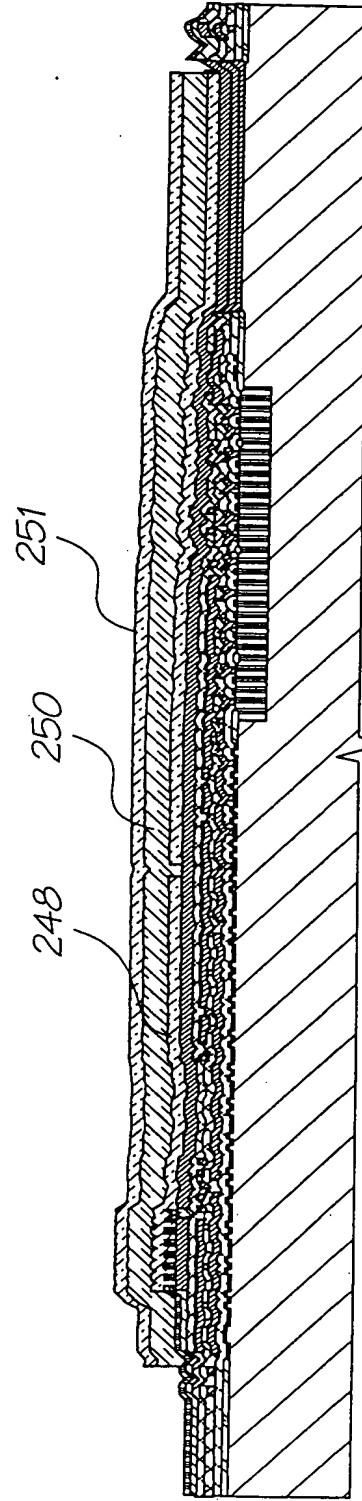


FIG. 55



Actuator / bend compensator mask

FIG. 56



Deposit actuator glass and bend compensator TiN, etch together

FIG. 57

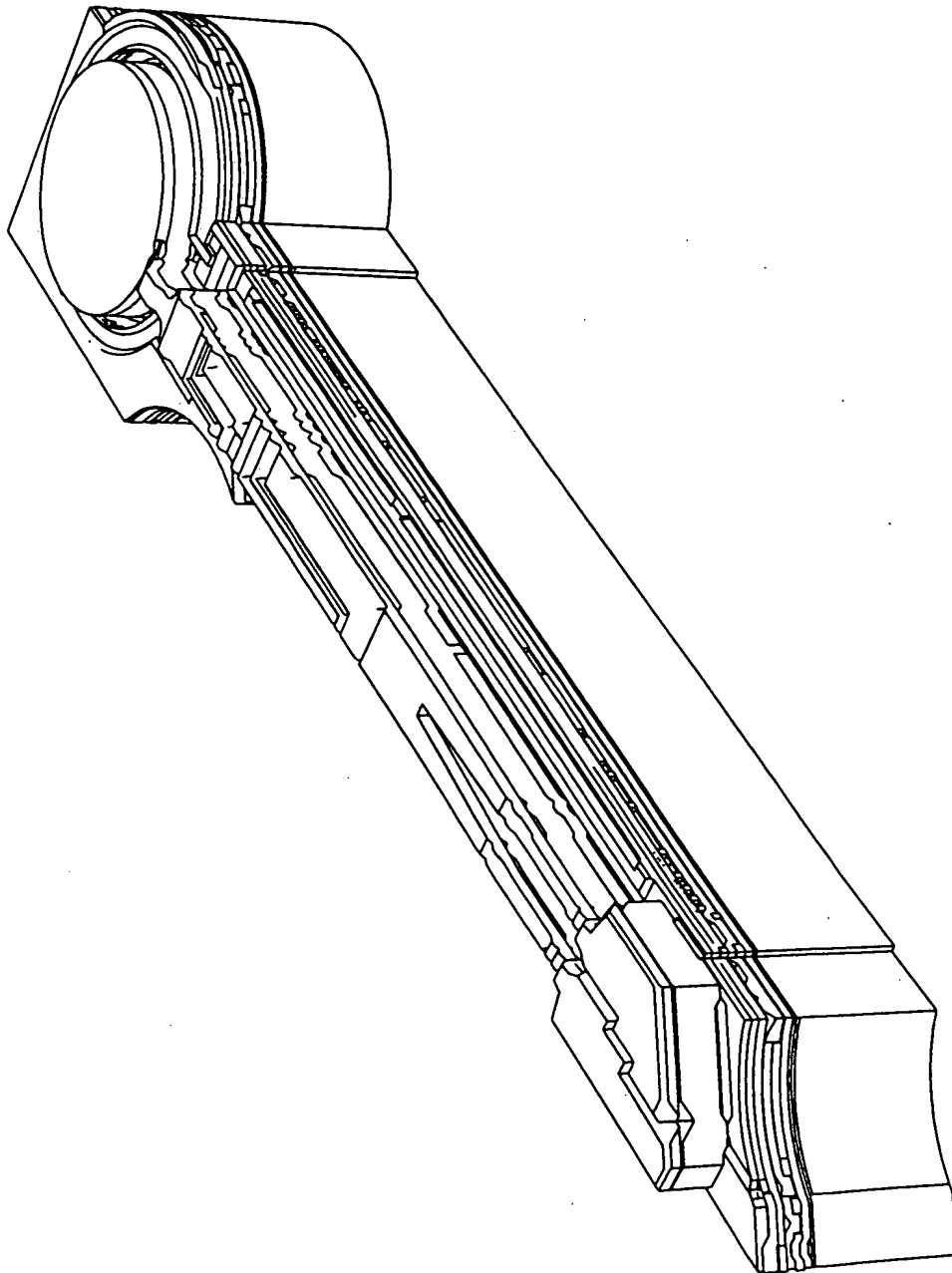
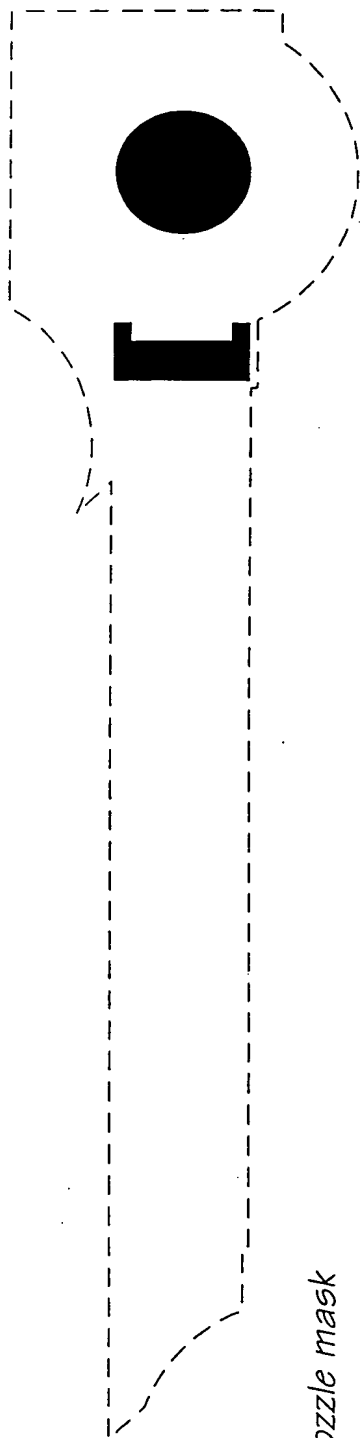


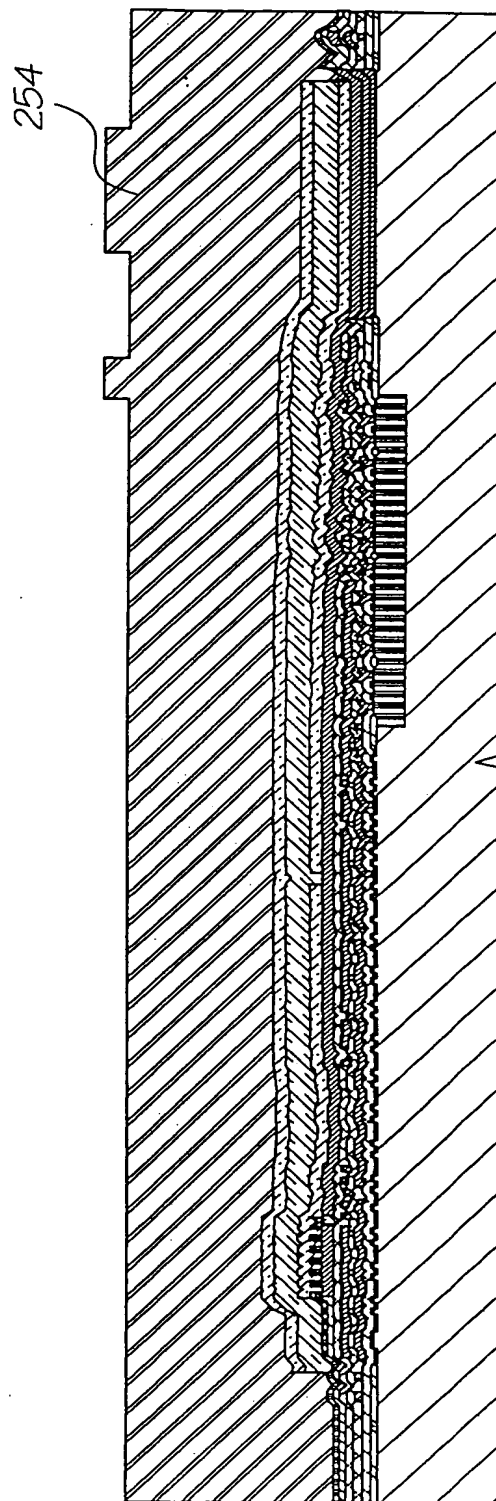
FIG. 58



Nozzle mask

FIG. 59

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Deposit sacrificial layer, etch nozzles

FIG. 60

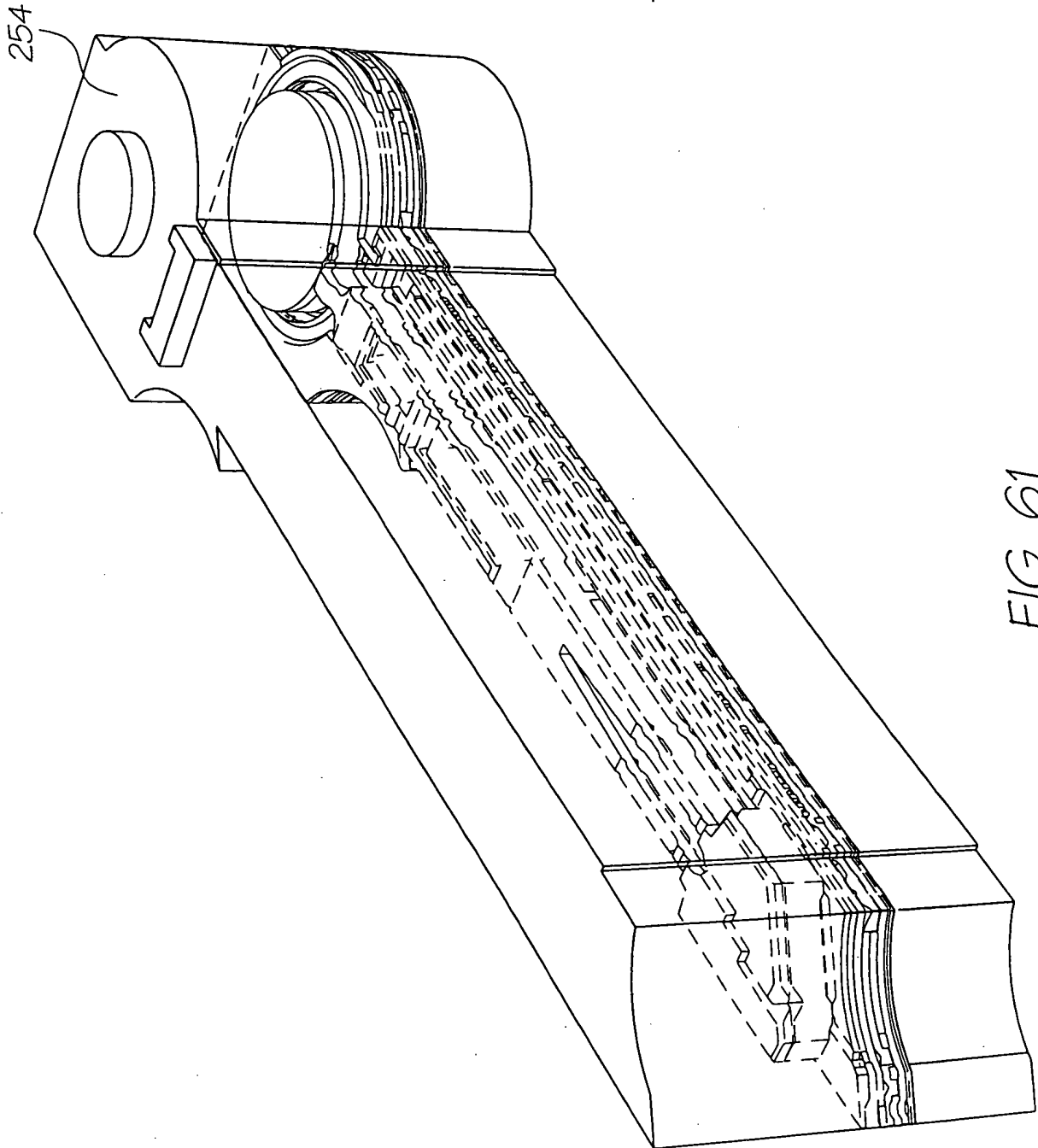
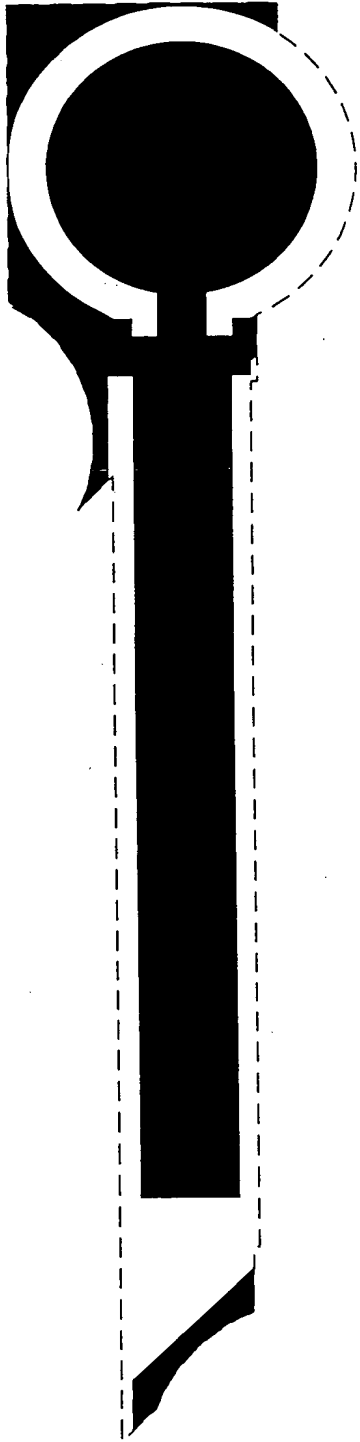


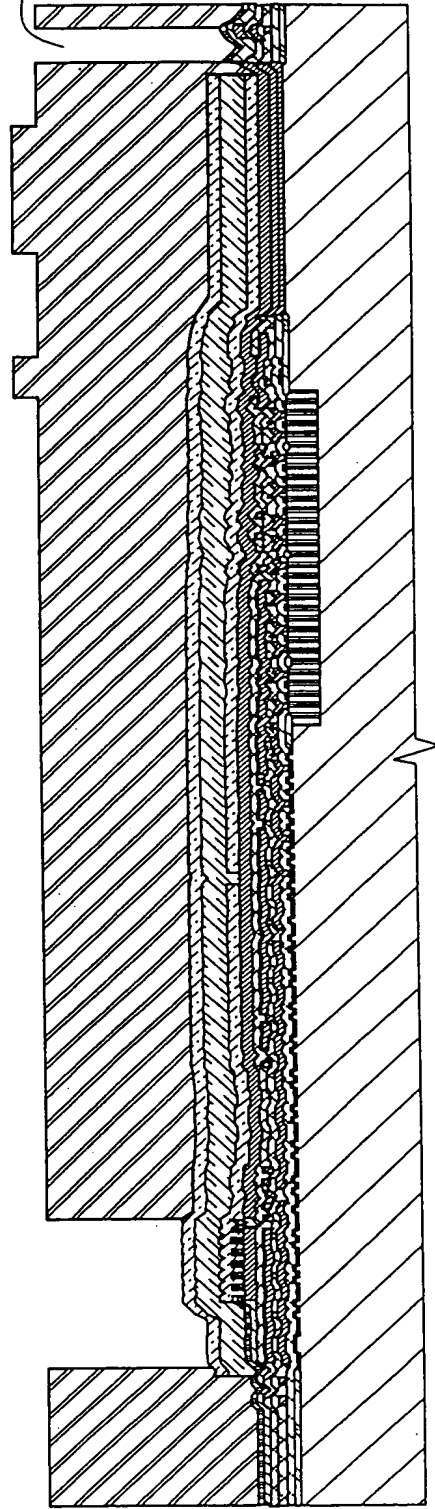
FIG. 61



Chamber mask

FIG. 62

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255



Etch chambers in sacrificial layer

FIG. 63

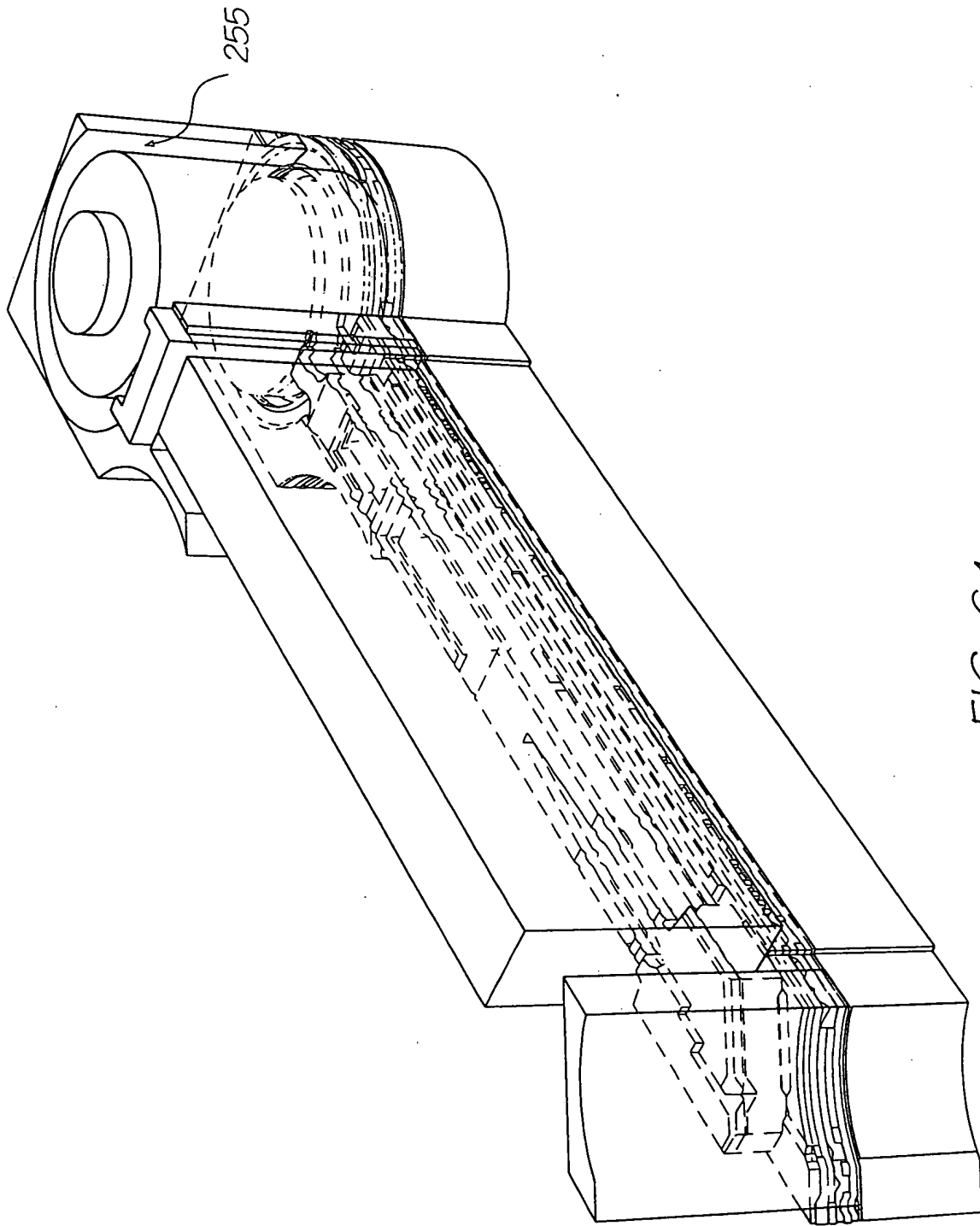
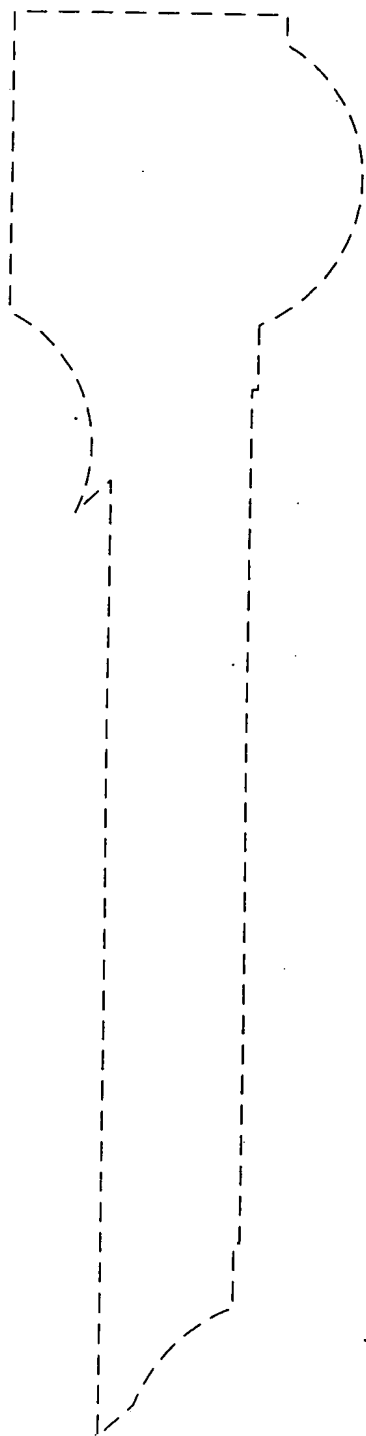


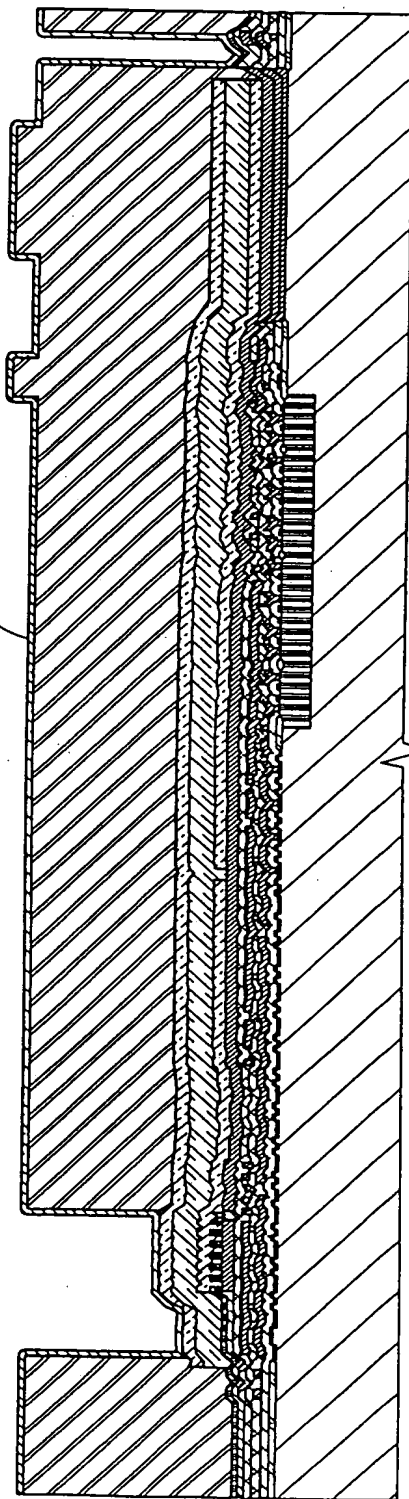
FIG. 64





No mask

257



Deposit chamber walls

FIG. 65

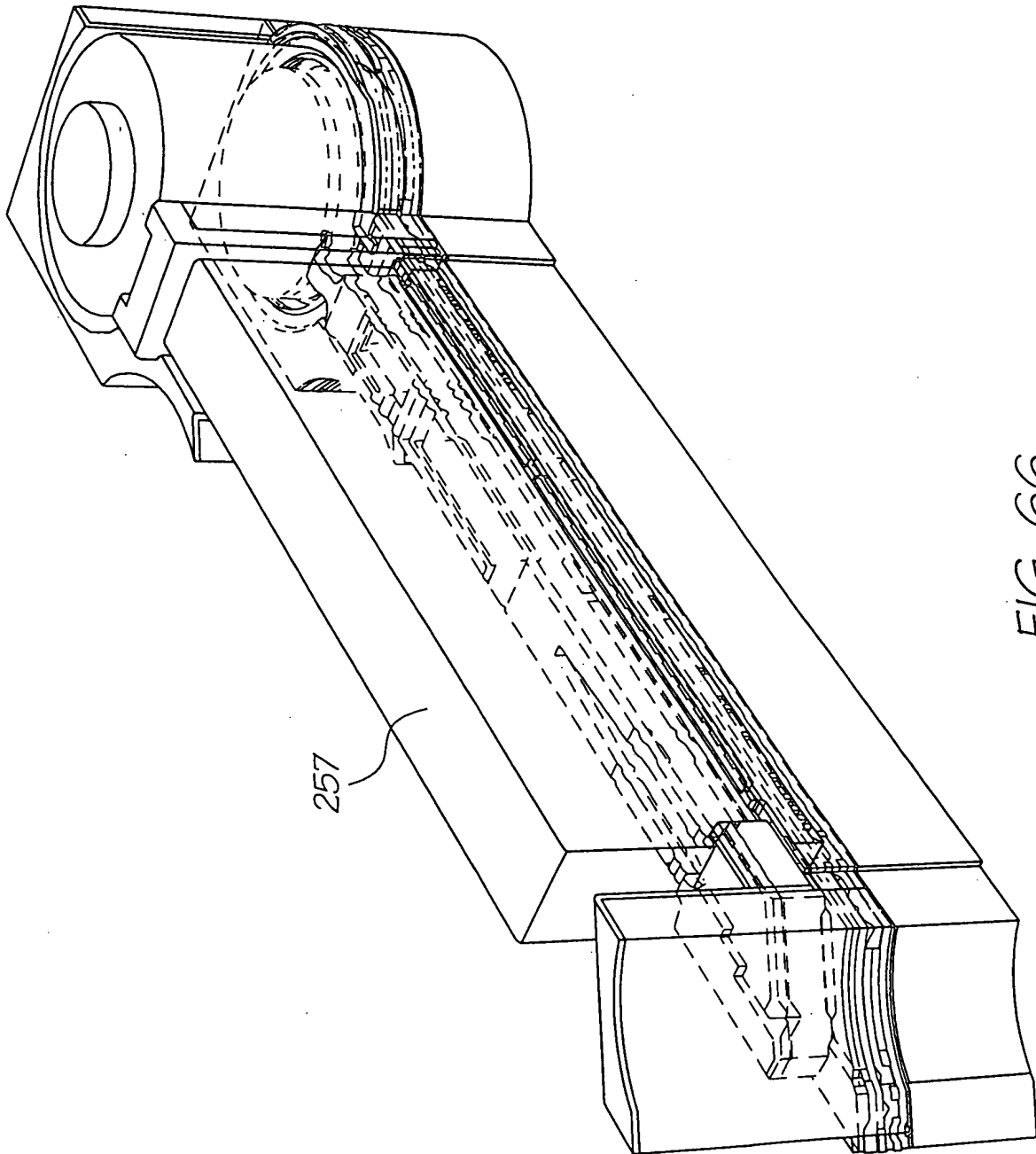
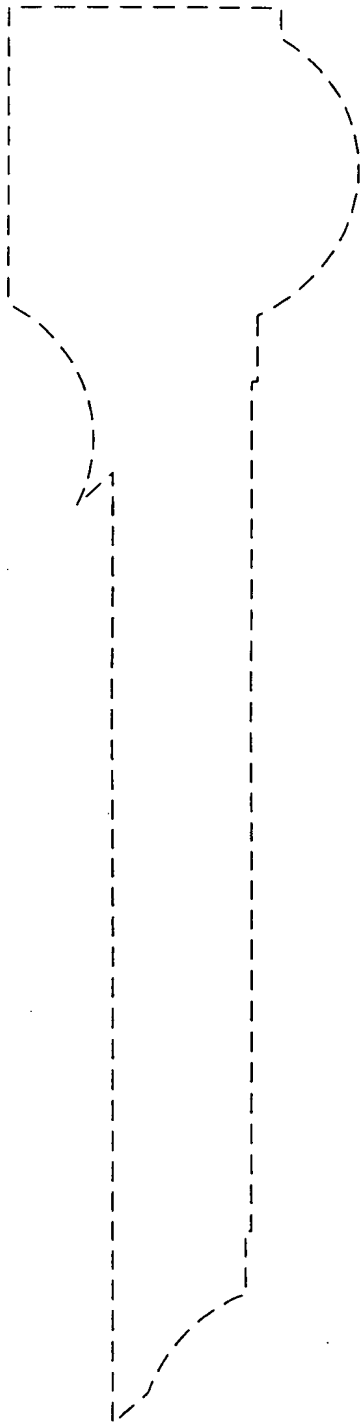
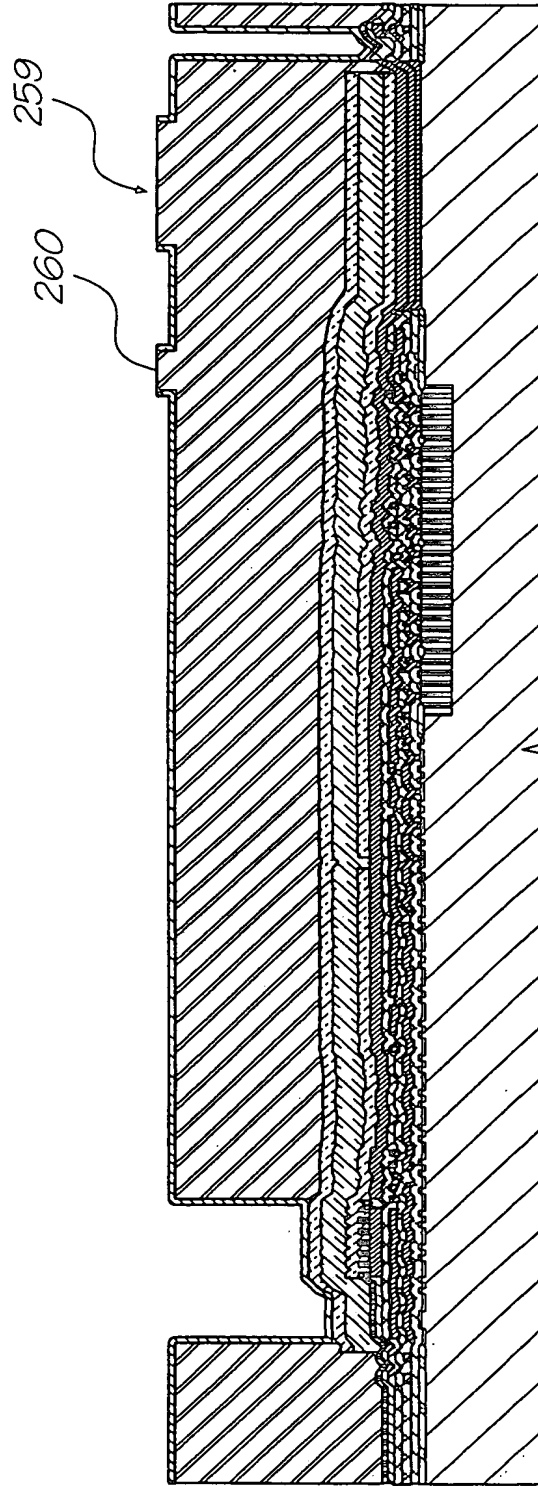


FIG. 66



No mask



Form self-aligned nozzles using CMP

FIG. 67

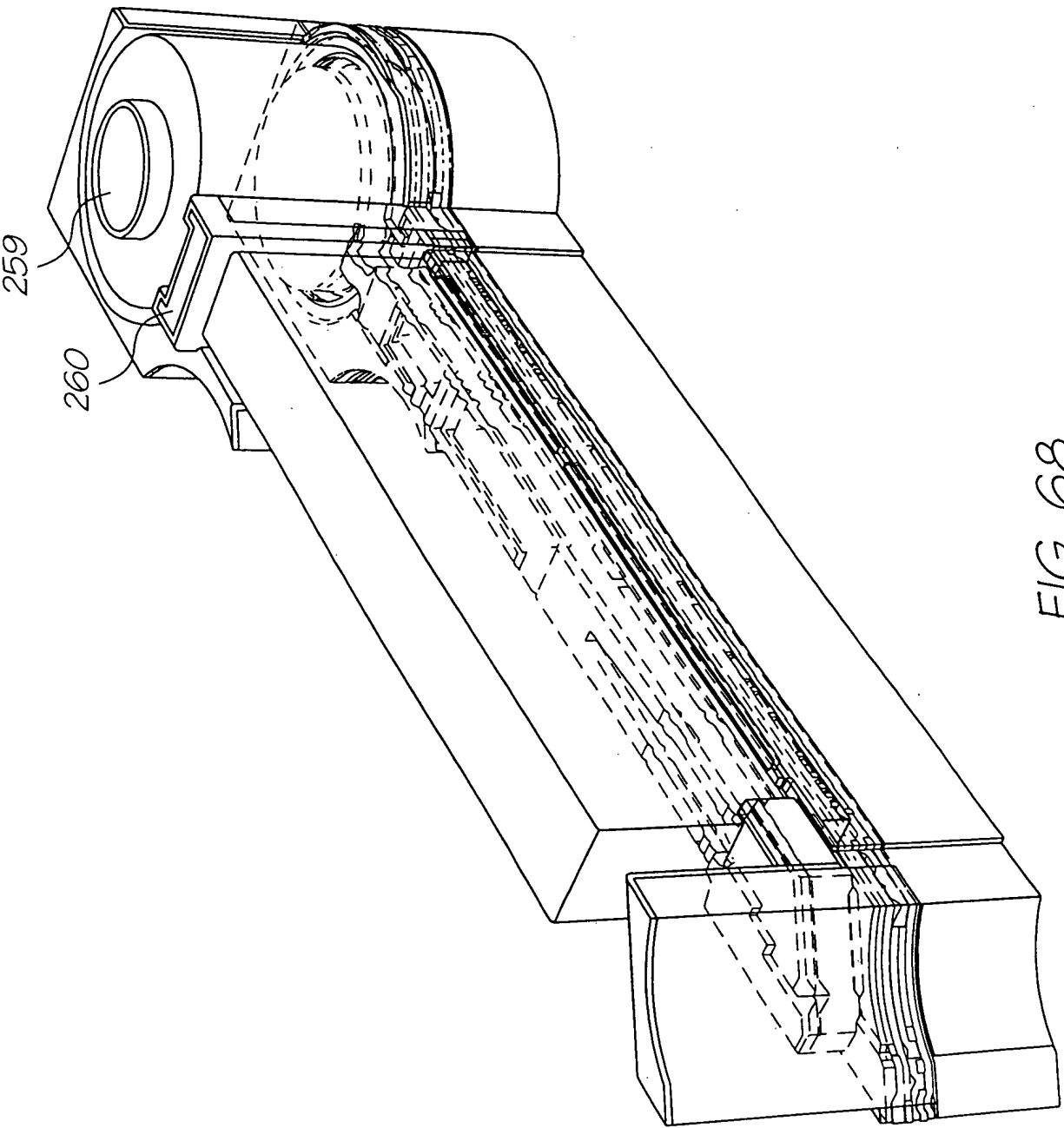
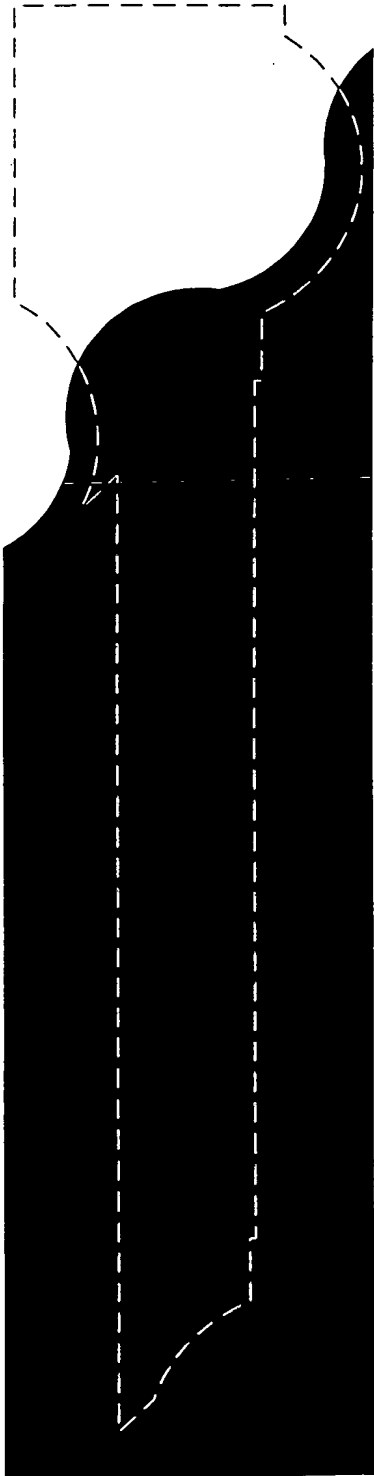
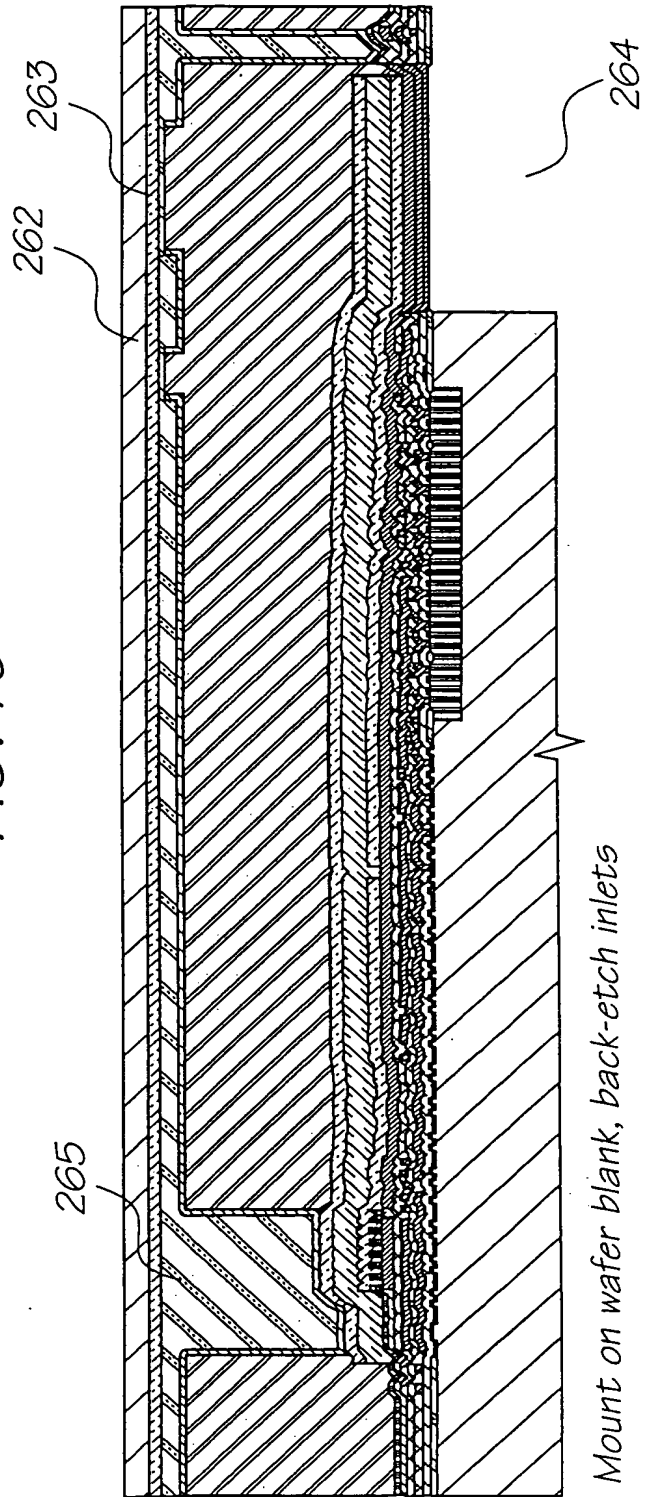


FIG. 68



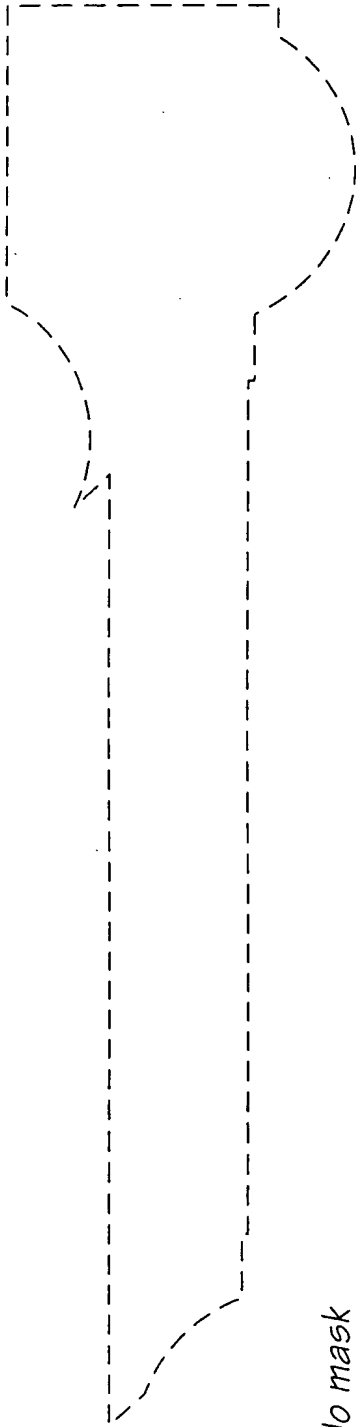
Back-etch inlet mask

FIG. 70

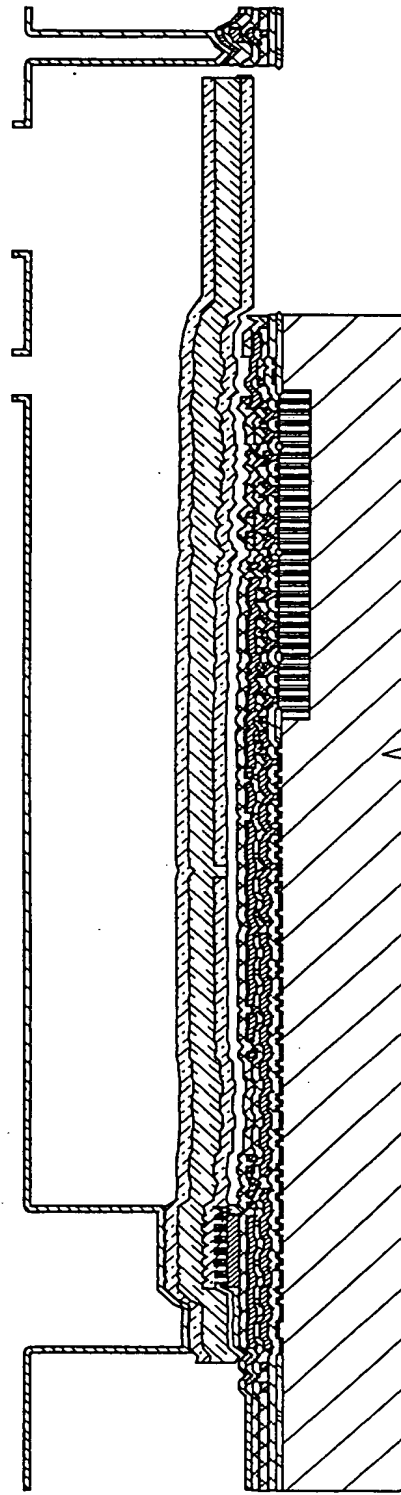


Mount on wafer blank, back-etch inlets

FIG. 69



No mask



Detach from wafer blank, etch sacrificial material

FIG. 71

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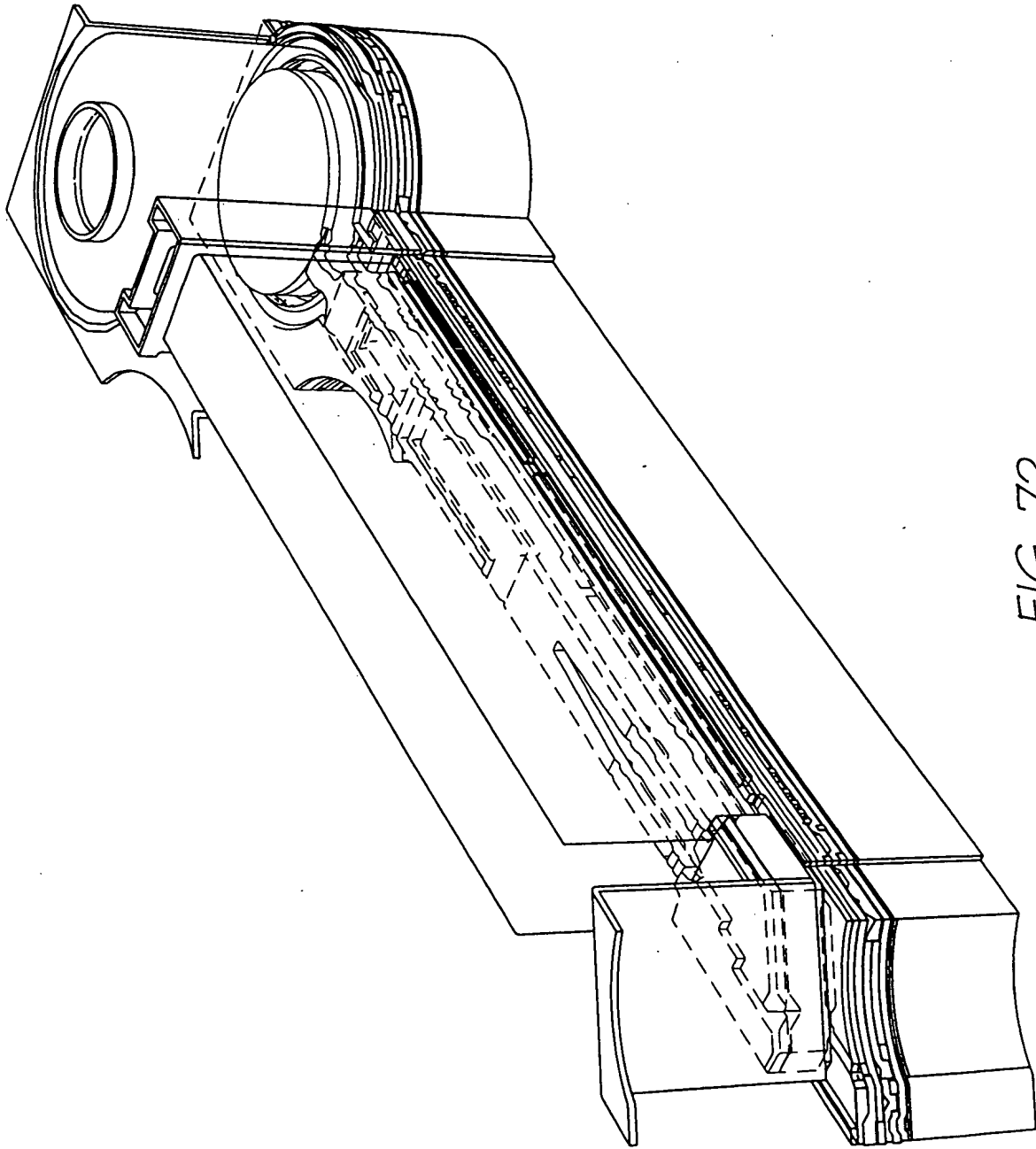


FIG. 72

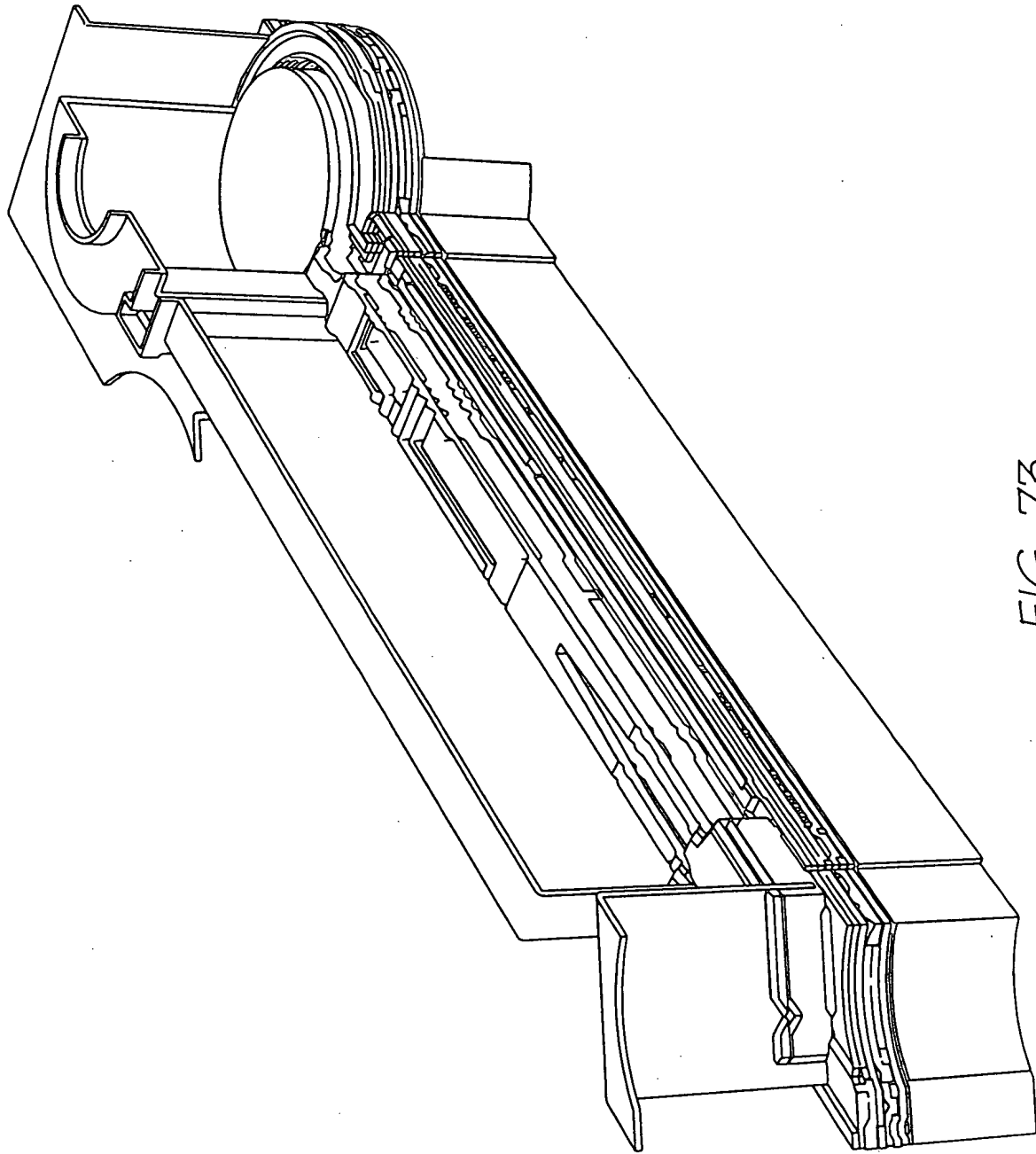
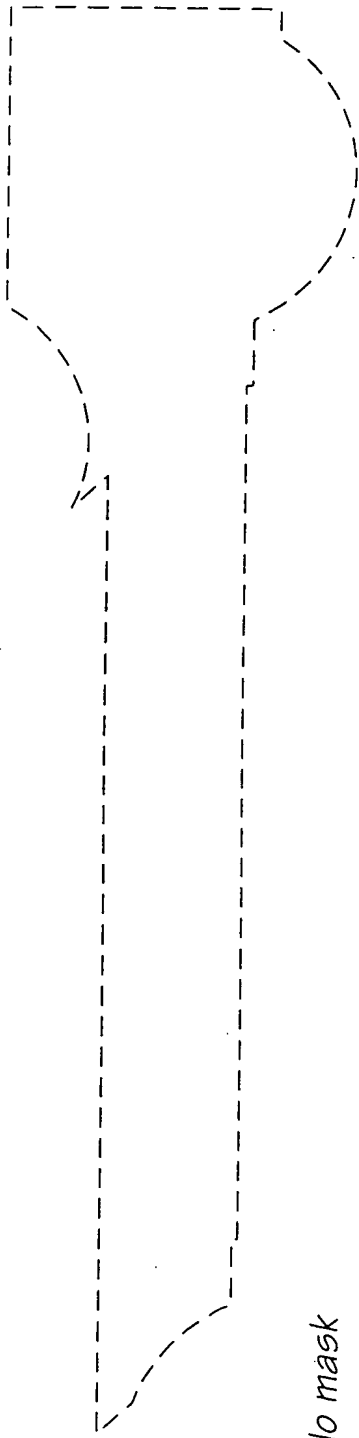
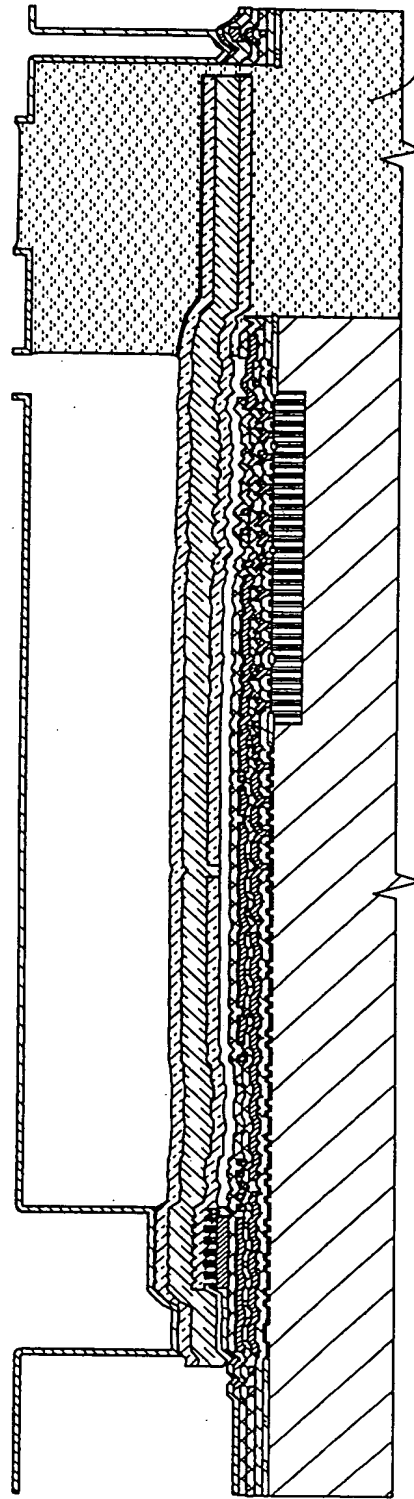


FIG. 73





No mask



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Package, fill with ink, test

FIG. 74

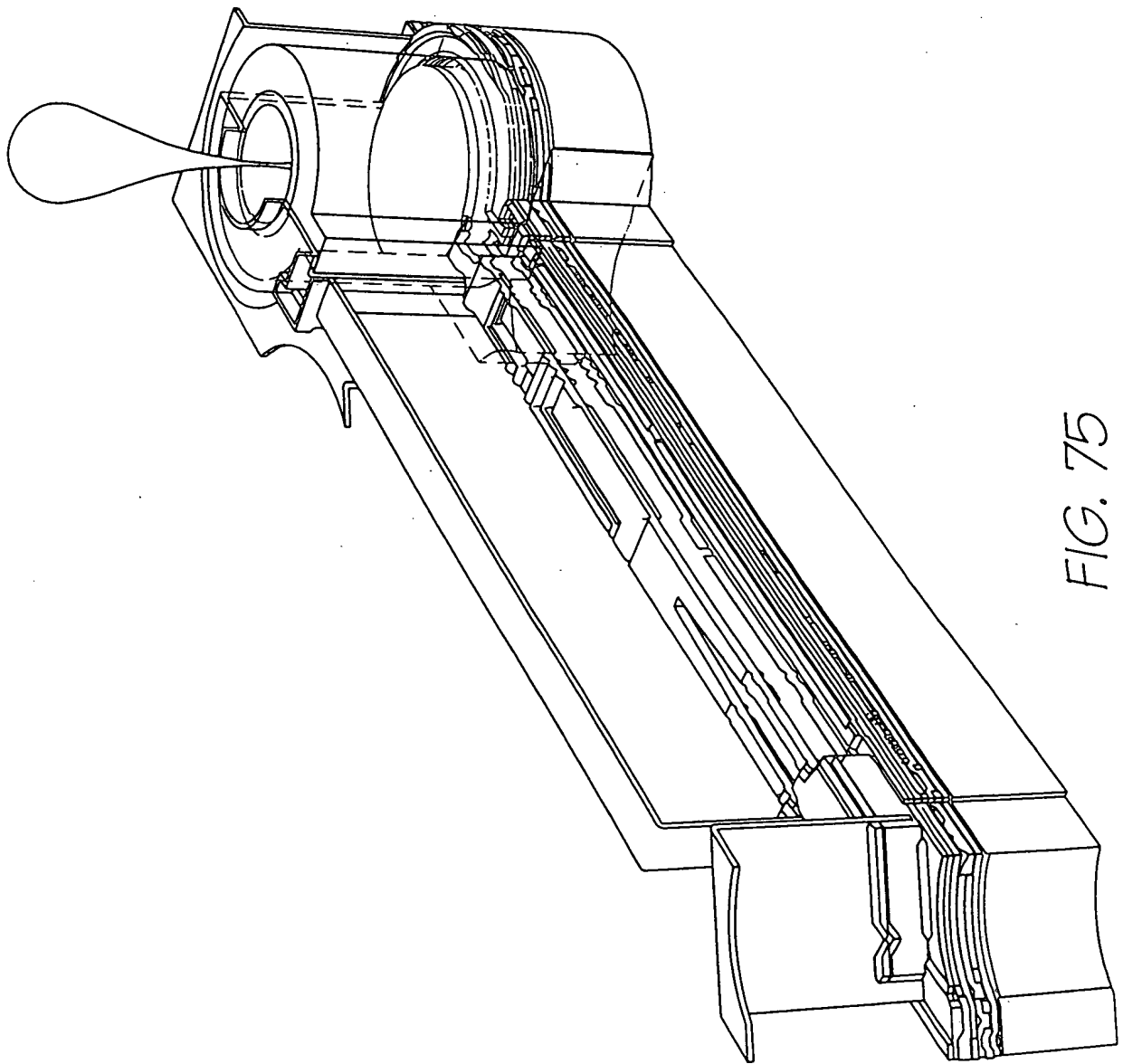


FIG. 75

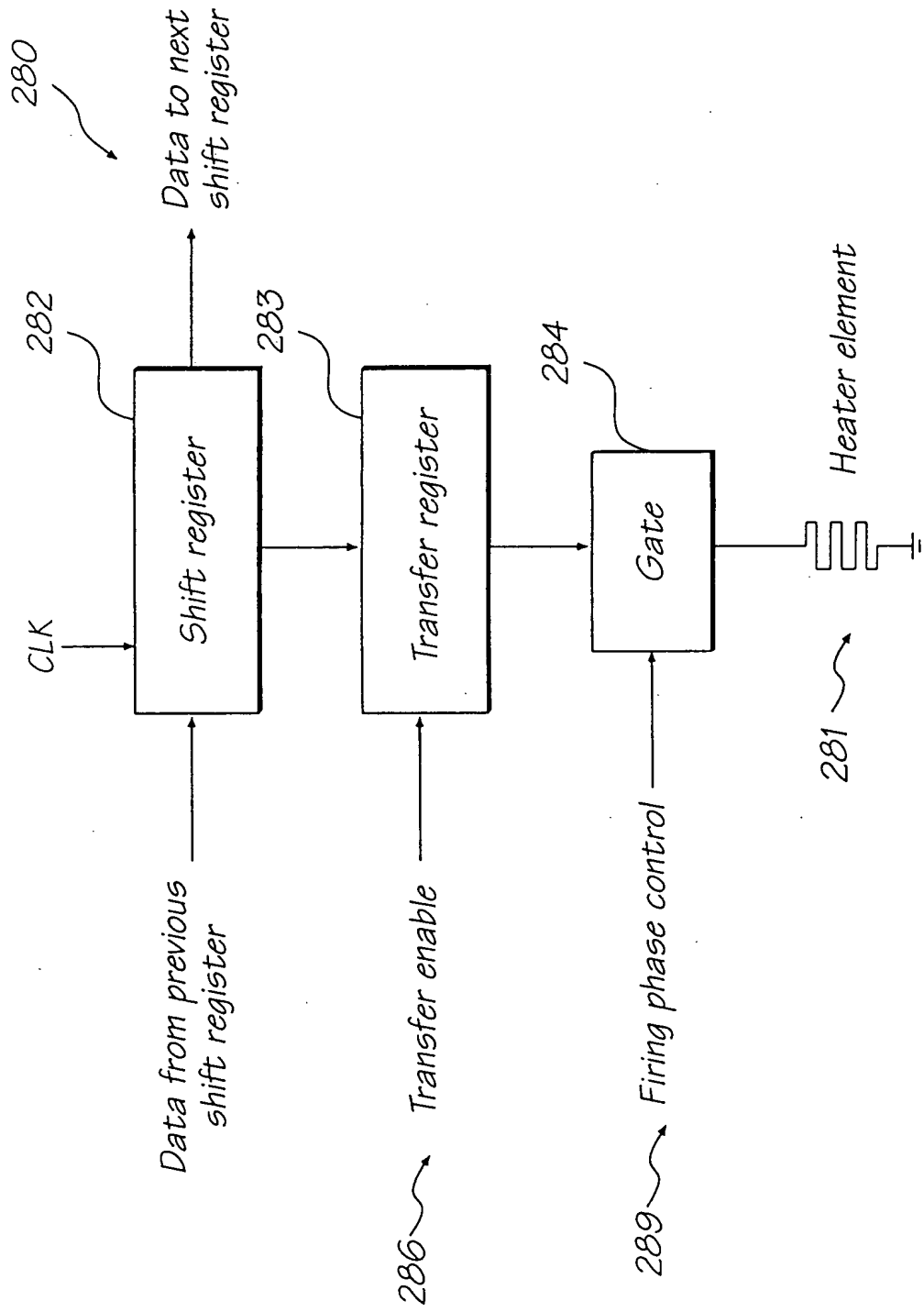


FIG. 76

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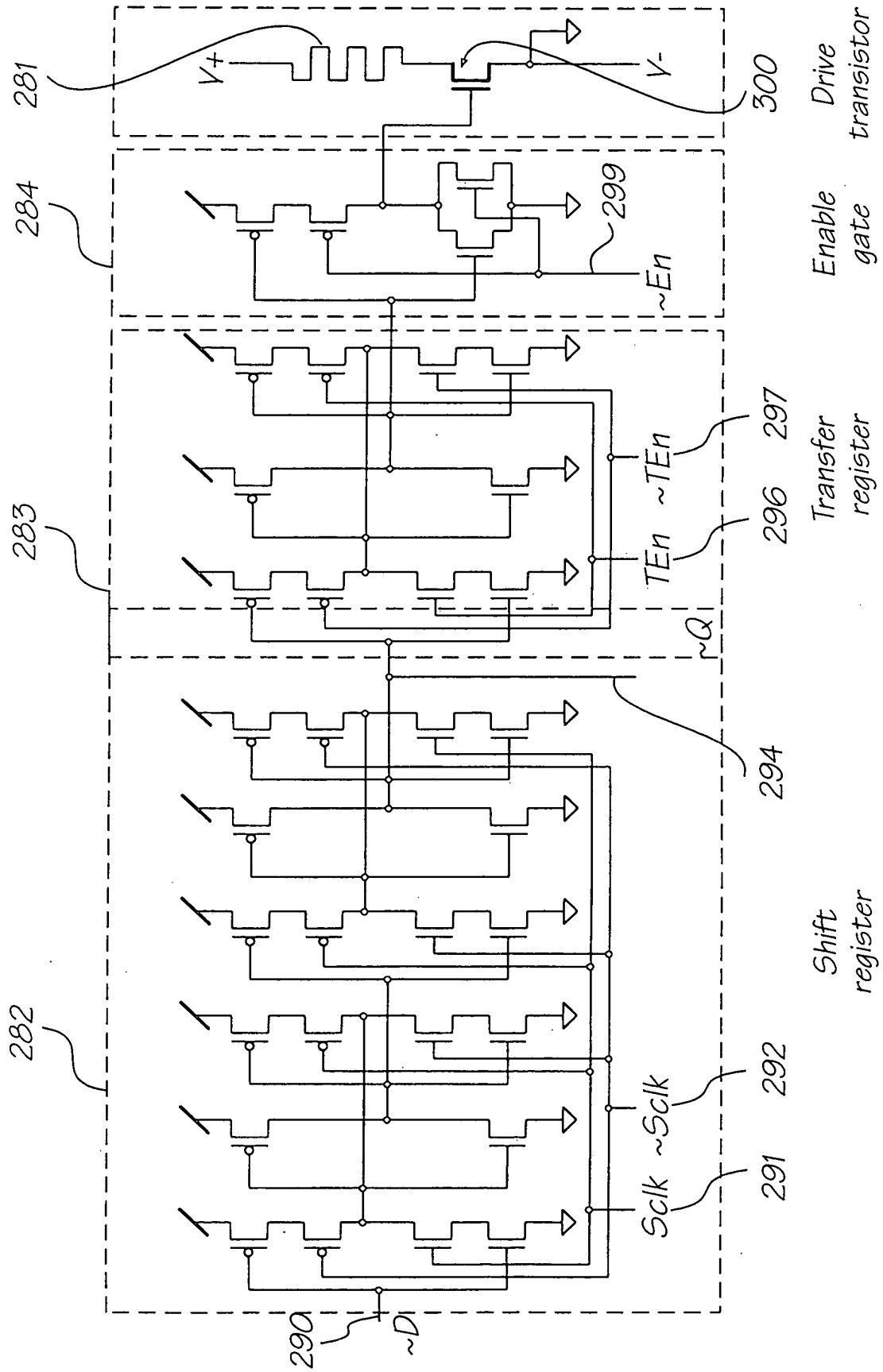


FIG. 77

## Key



























	Silicon		Poly		Via 2		Actuator TiN		Cyan Ink
	Contacts		Contacts		Metal 3		Actuator Glass		Magenta Ink
	Active		Metal 1		Via 3		Compensator TiN		Yellow Ink
	p+		Via 1				Sacrificial		
	n+		Metal 2				Sacrificial-nozzle		
									Floor
									Wall
									Roof
									Rim
									Shroud

FIG. 78

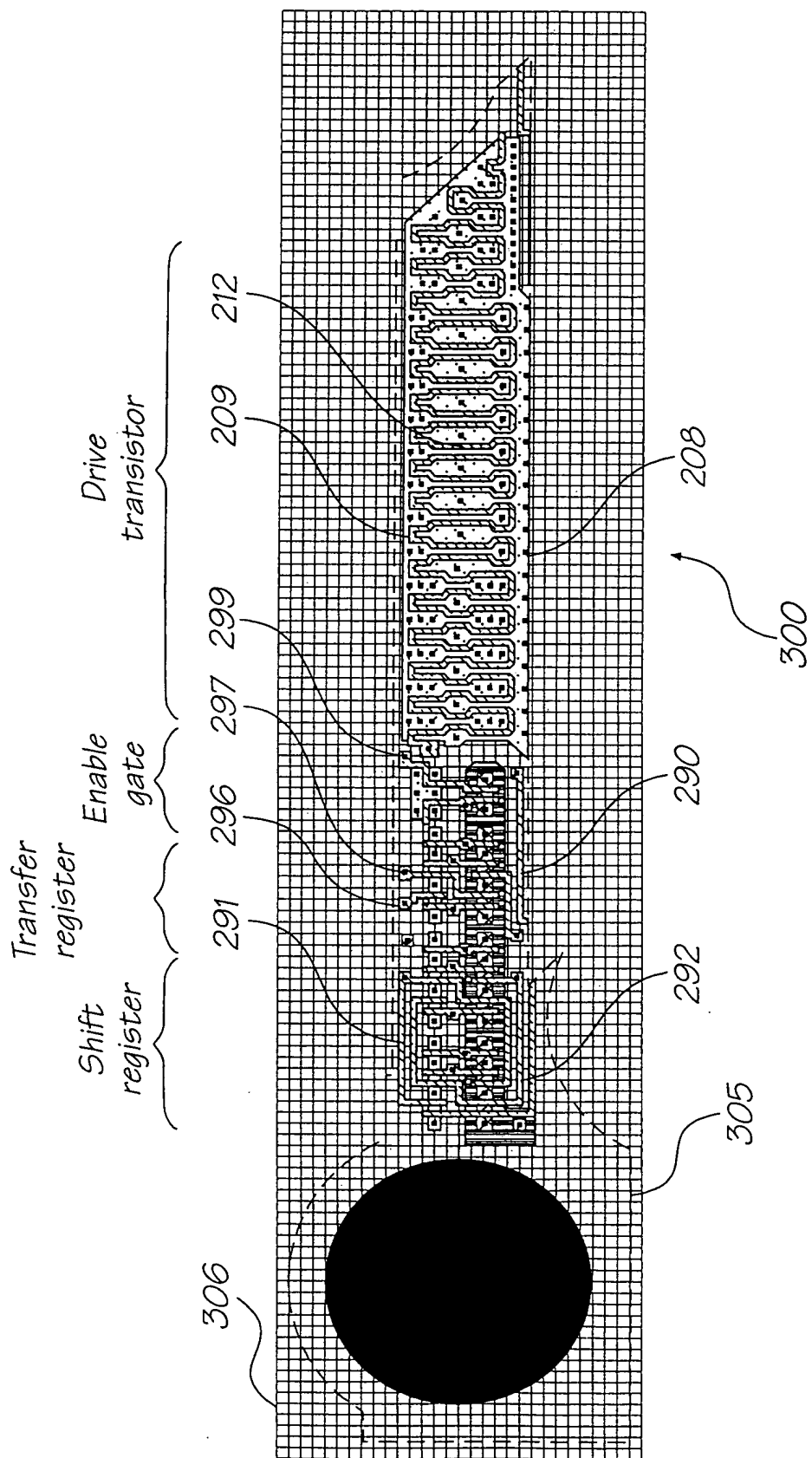


FIG. 79

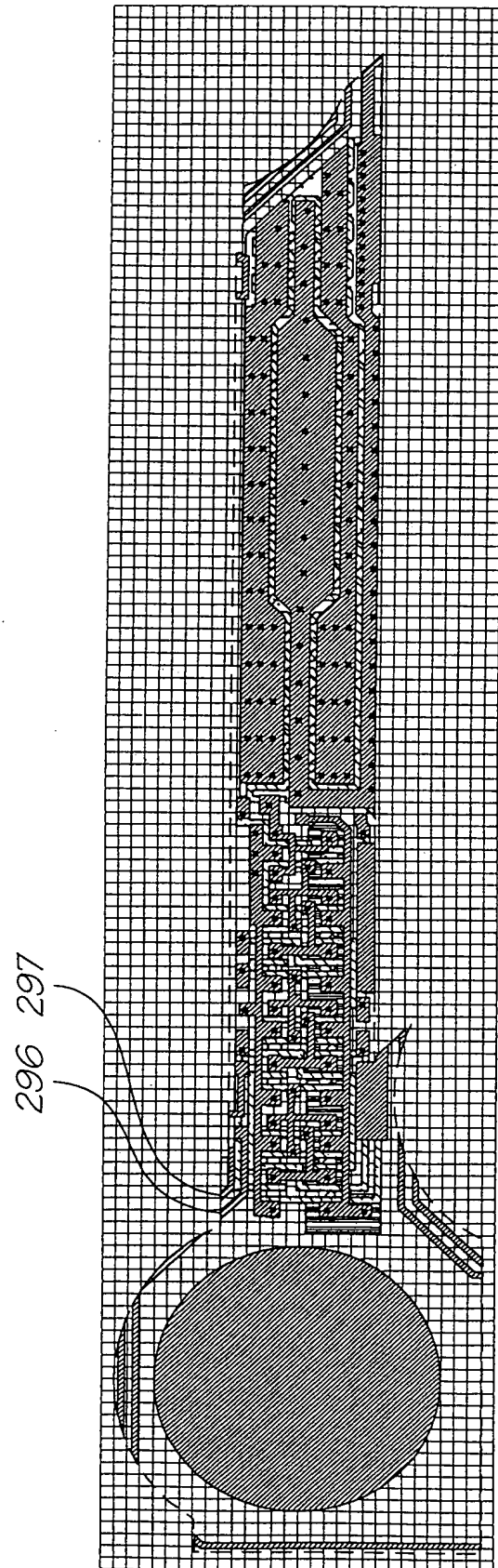


FIG. 80

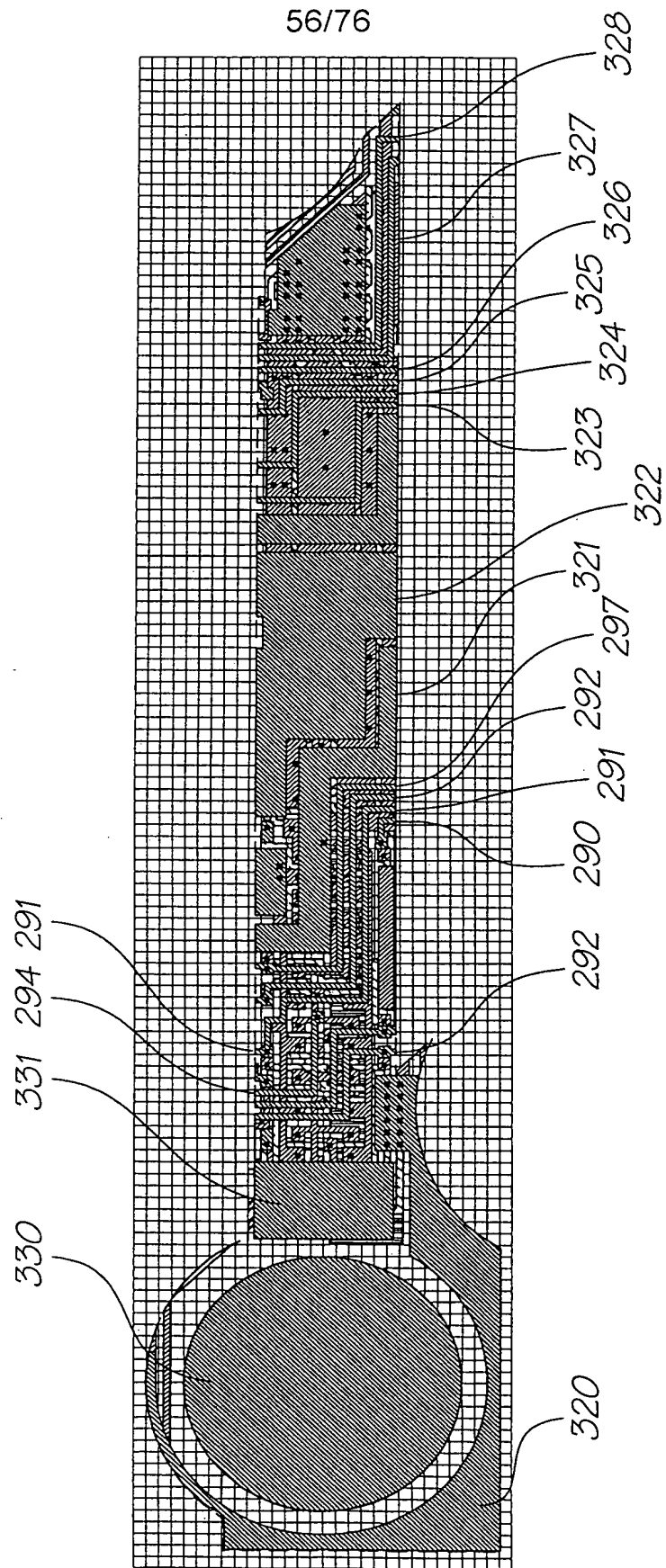


FIG. 81



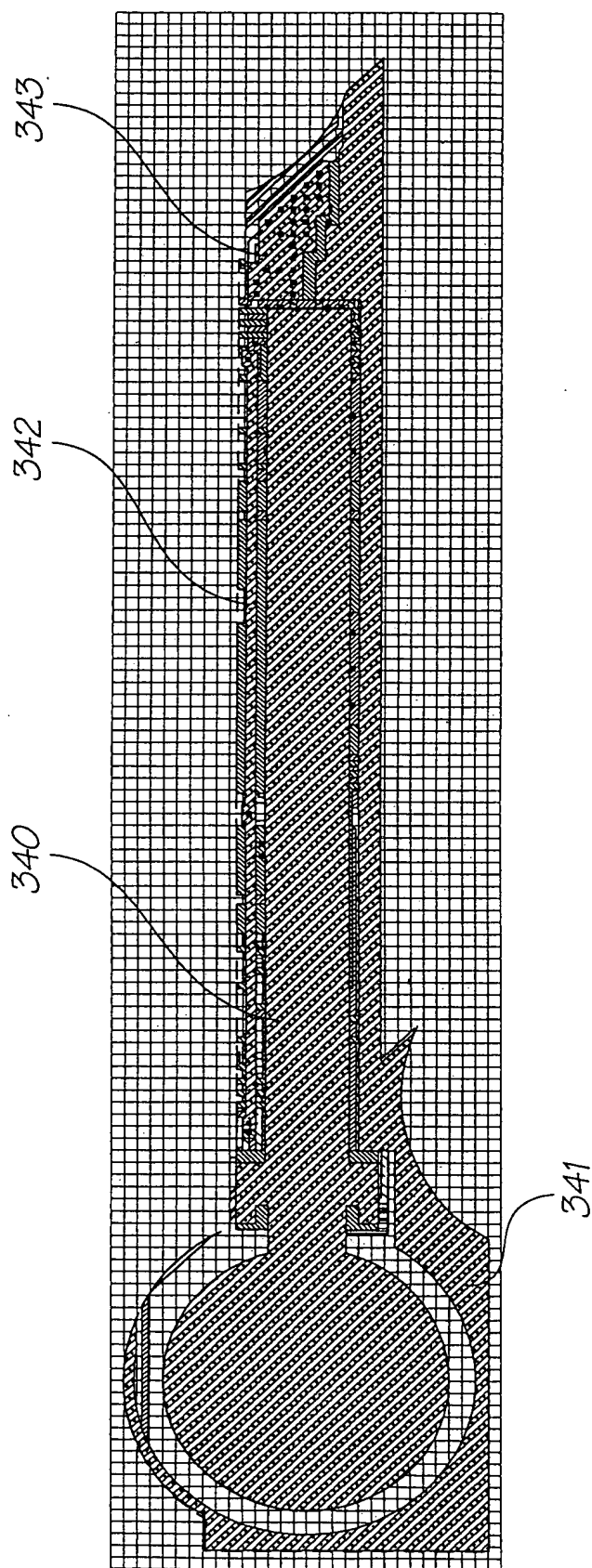


FIG. 82

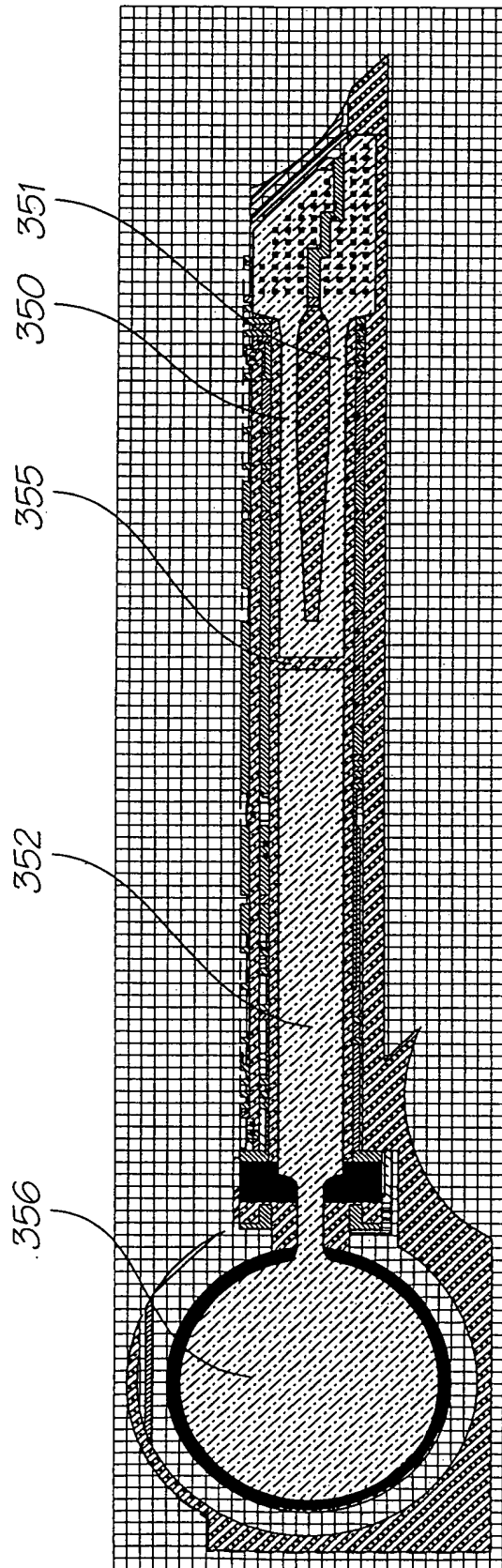


FIG. 83

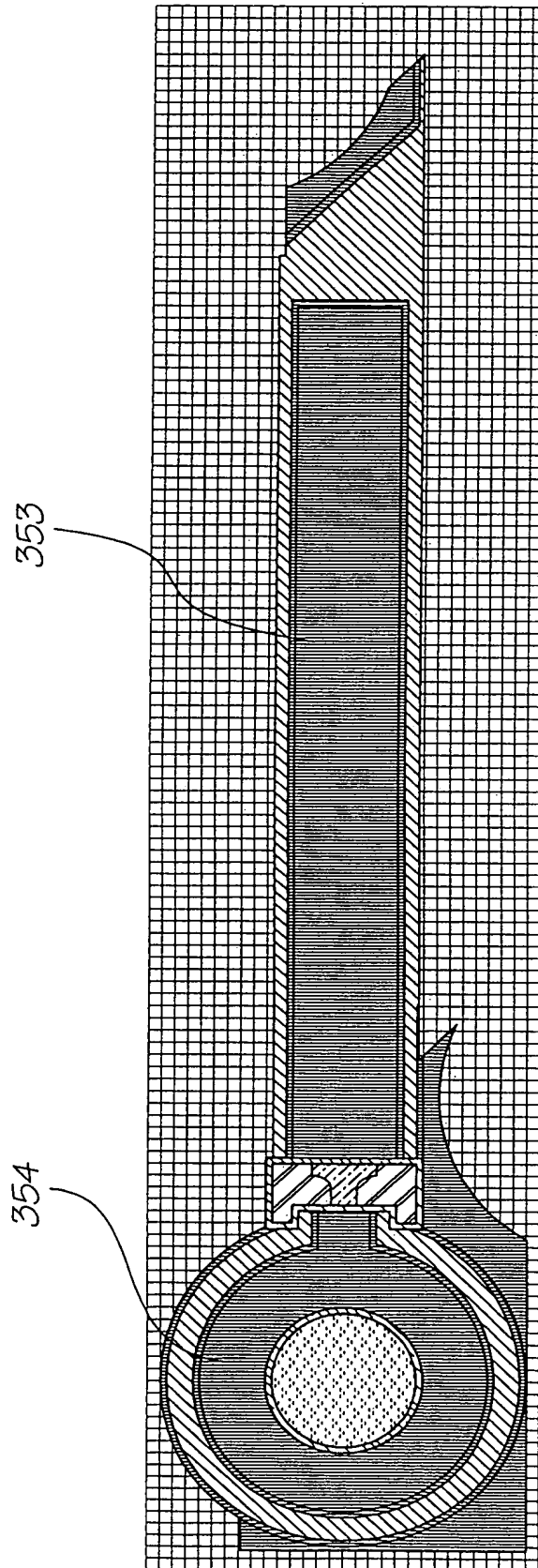


FIG. 84

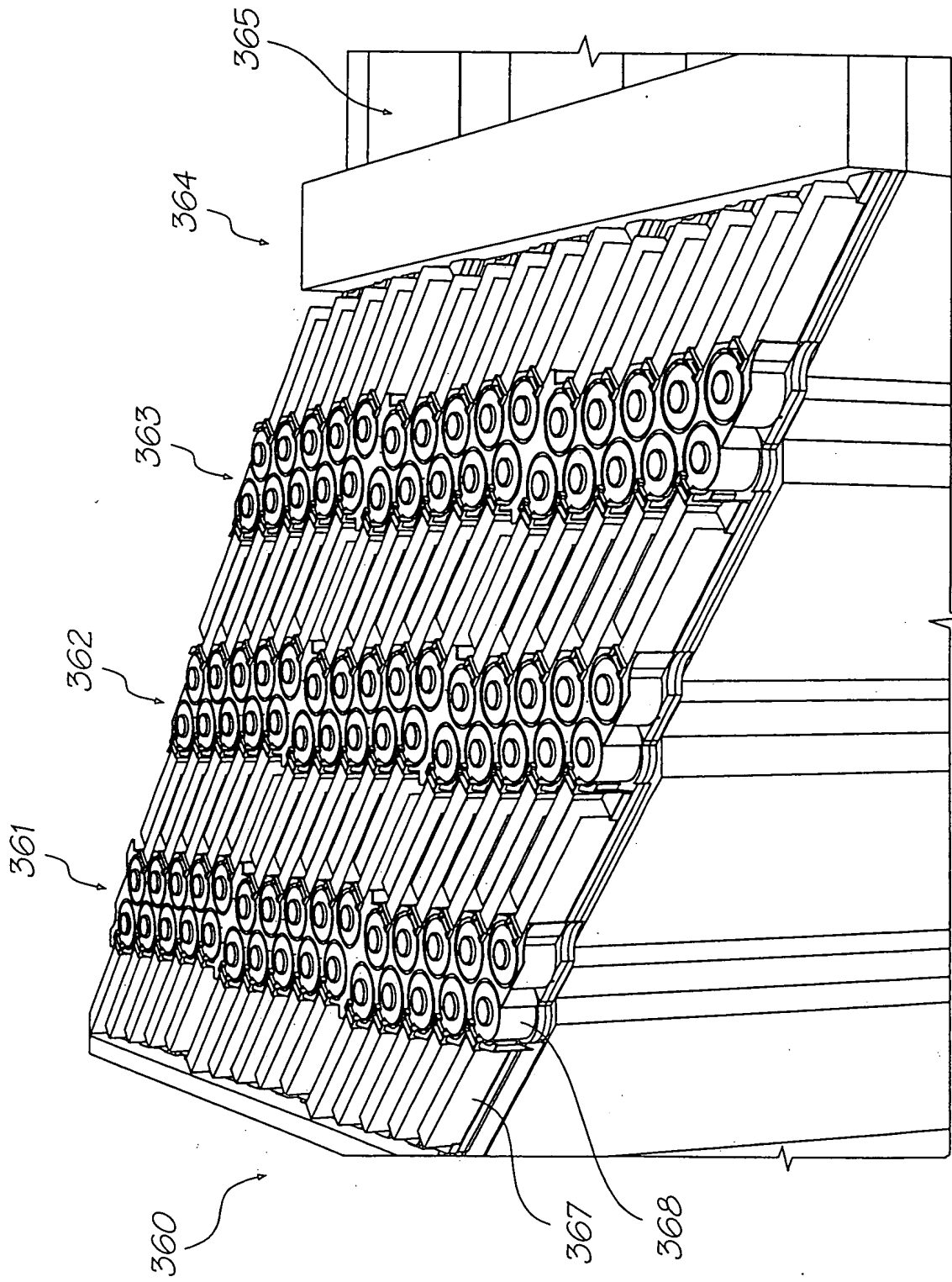
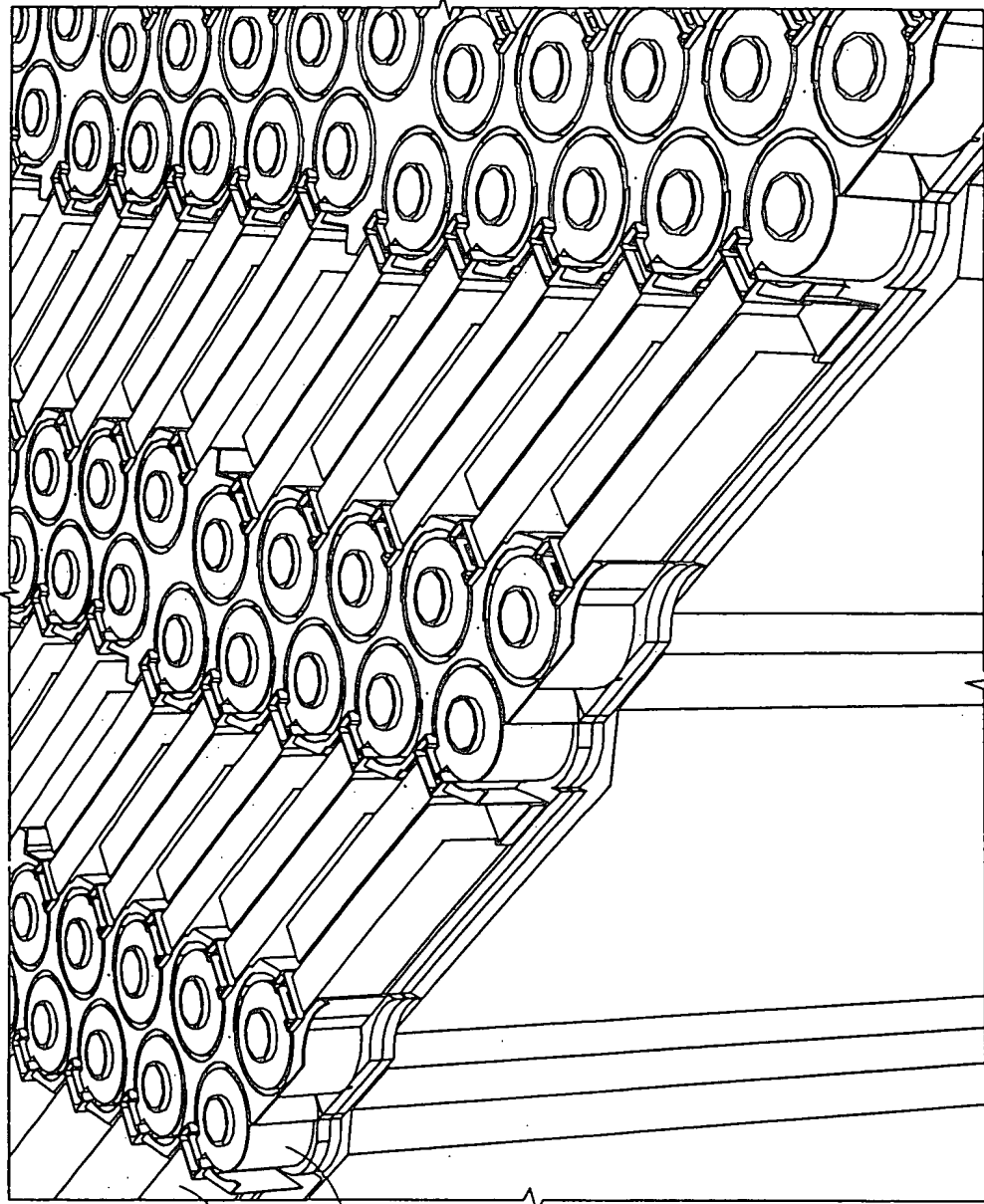


FIG. 85



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FIG. 86

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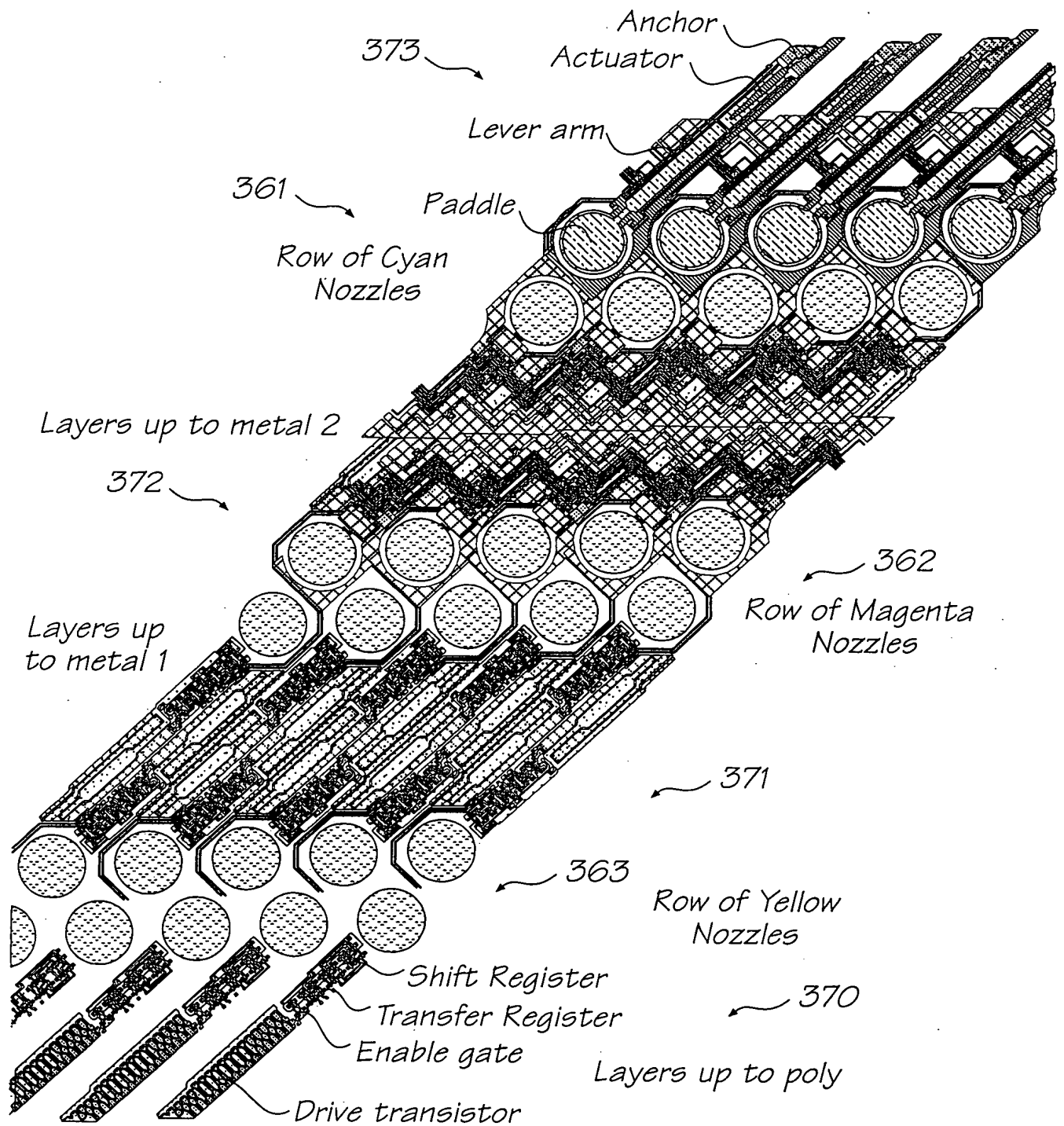


FIG. 87

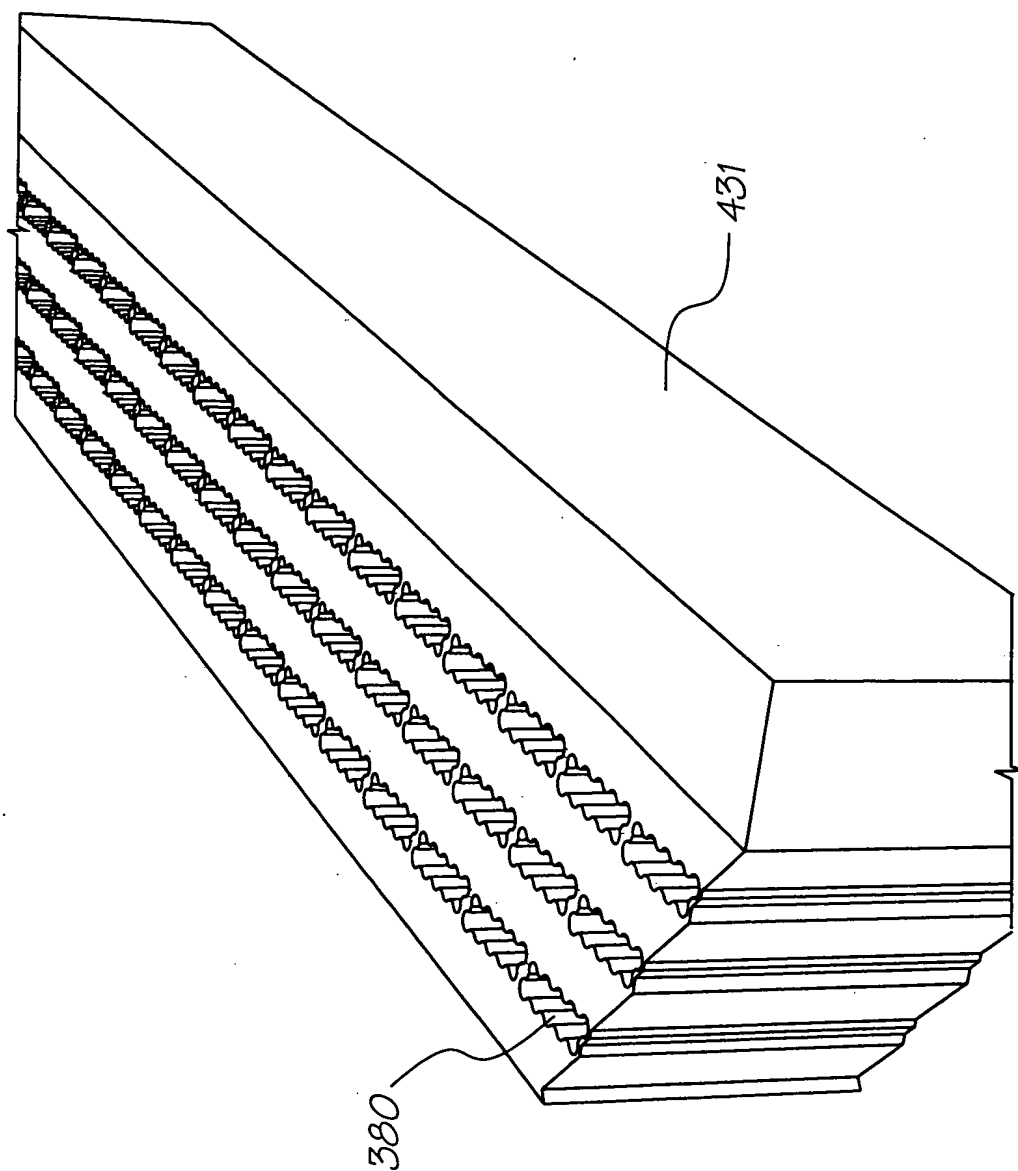


FIG. 88

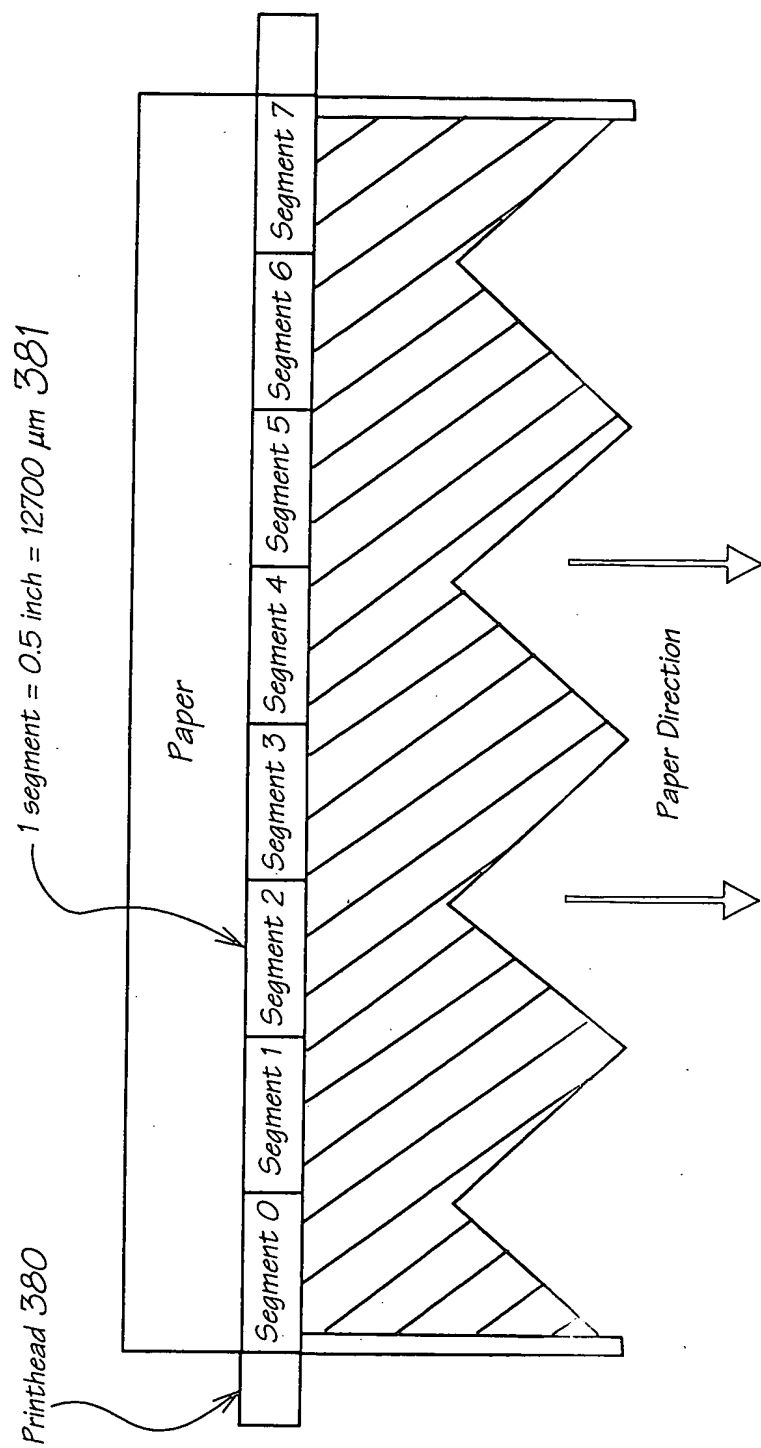
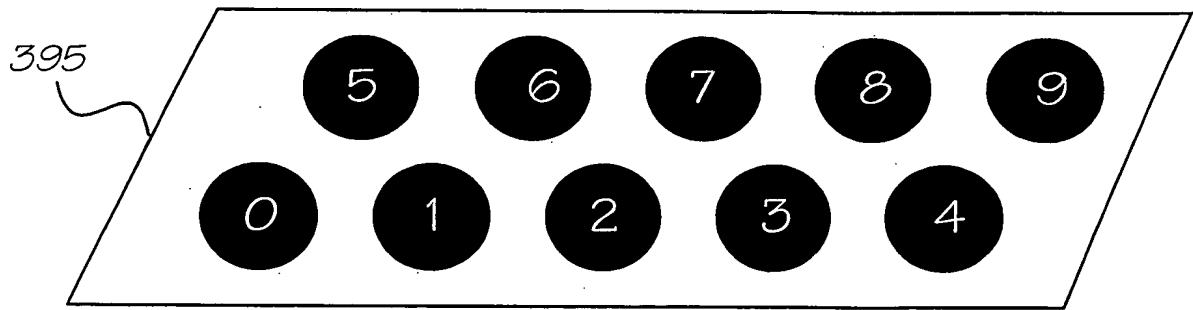


FIG. 89





A single pod, numbered by firing order

Fig. 90

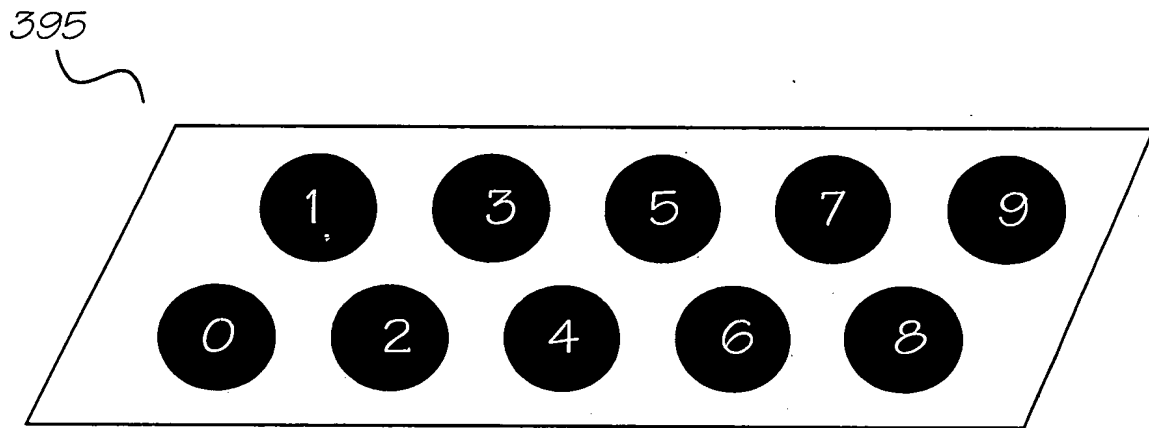


Fig. 91

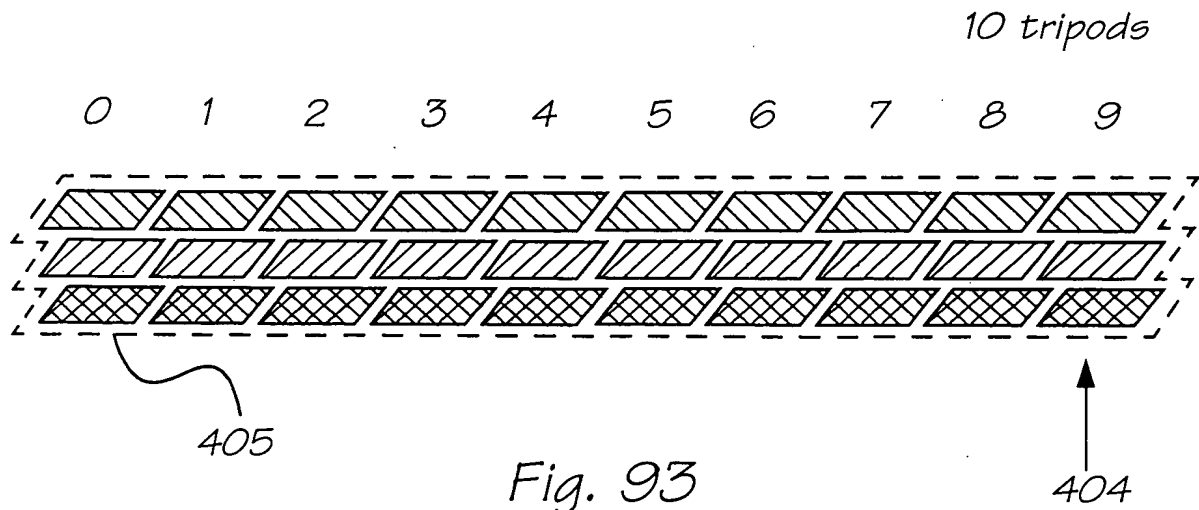


Fig. 93

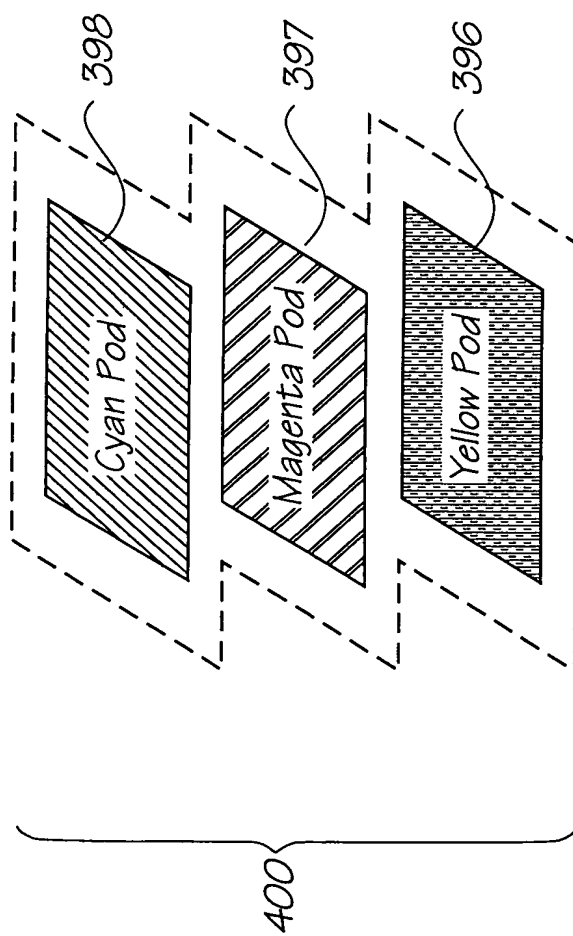


FIG. 92

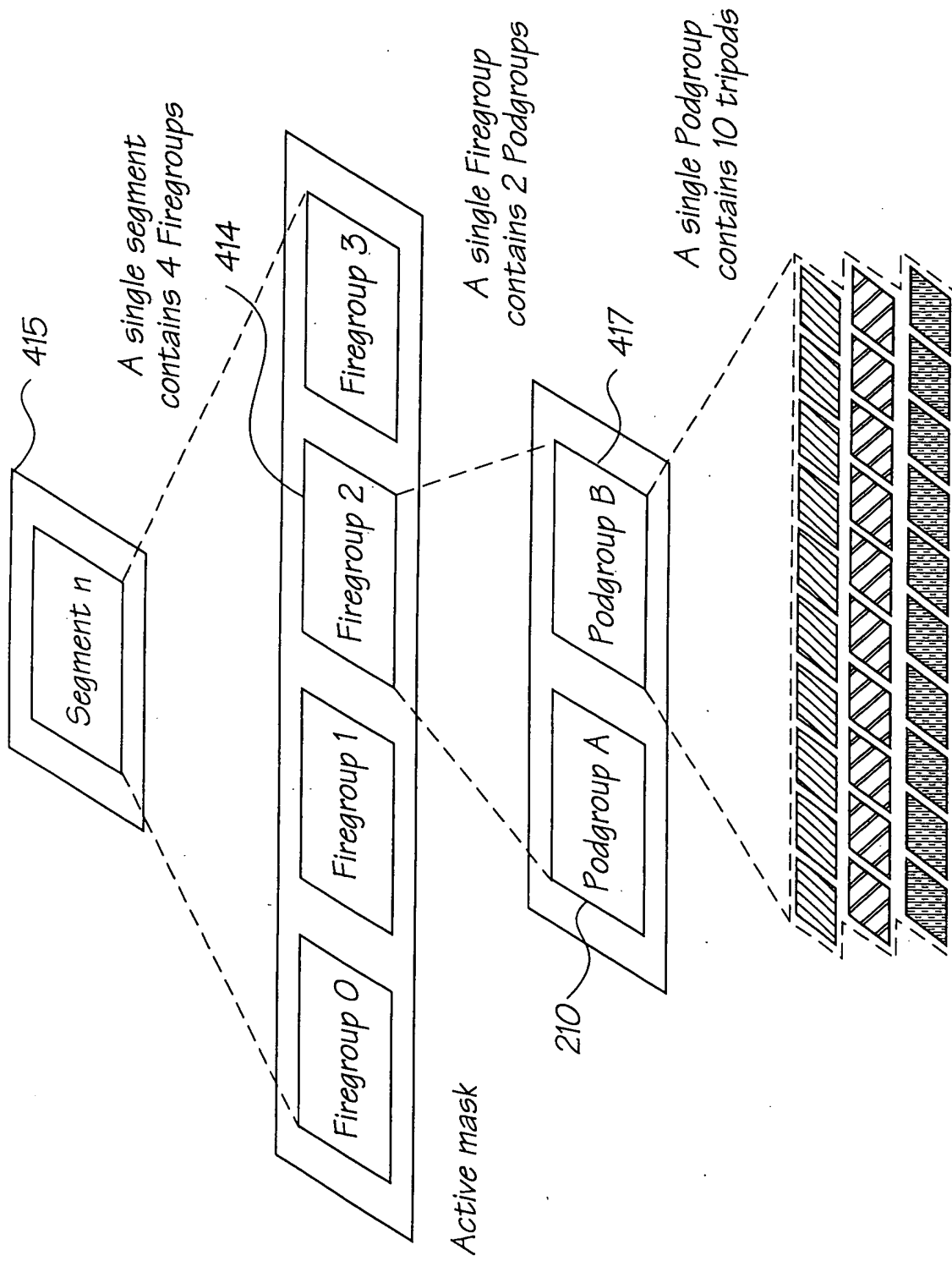


FIG. 94

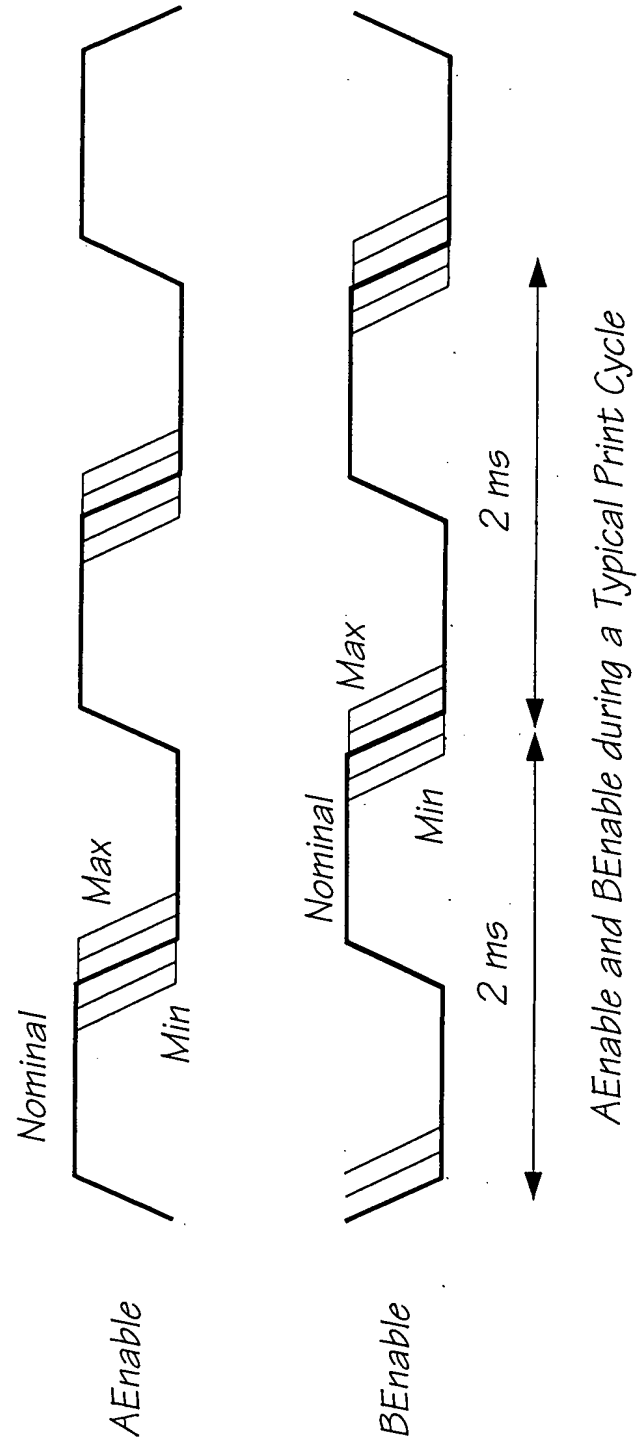


Fig. 95

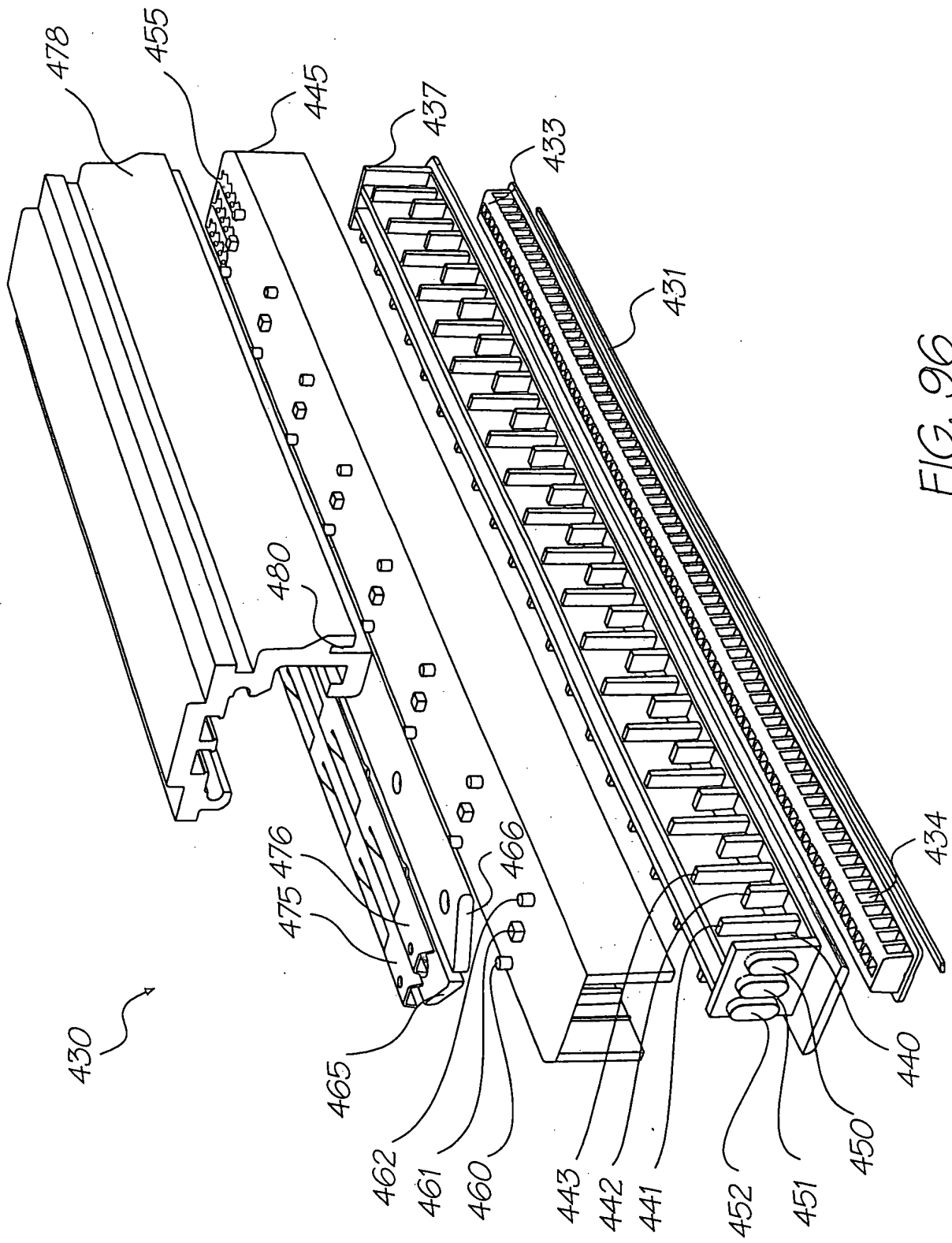


FIG. 96

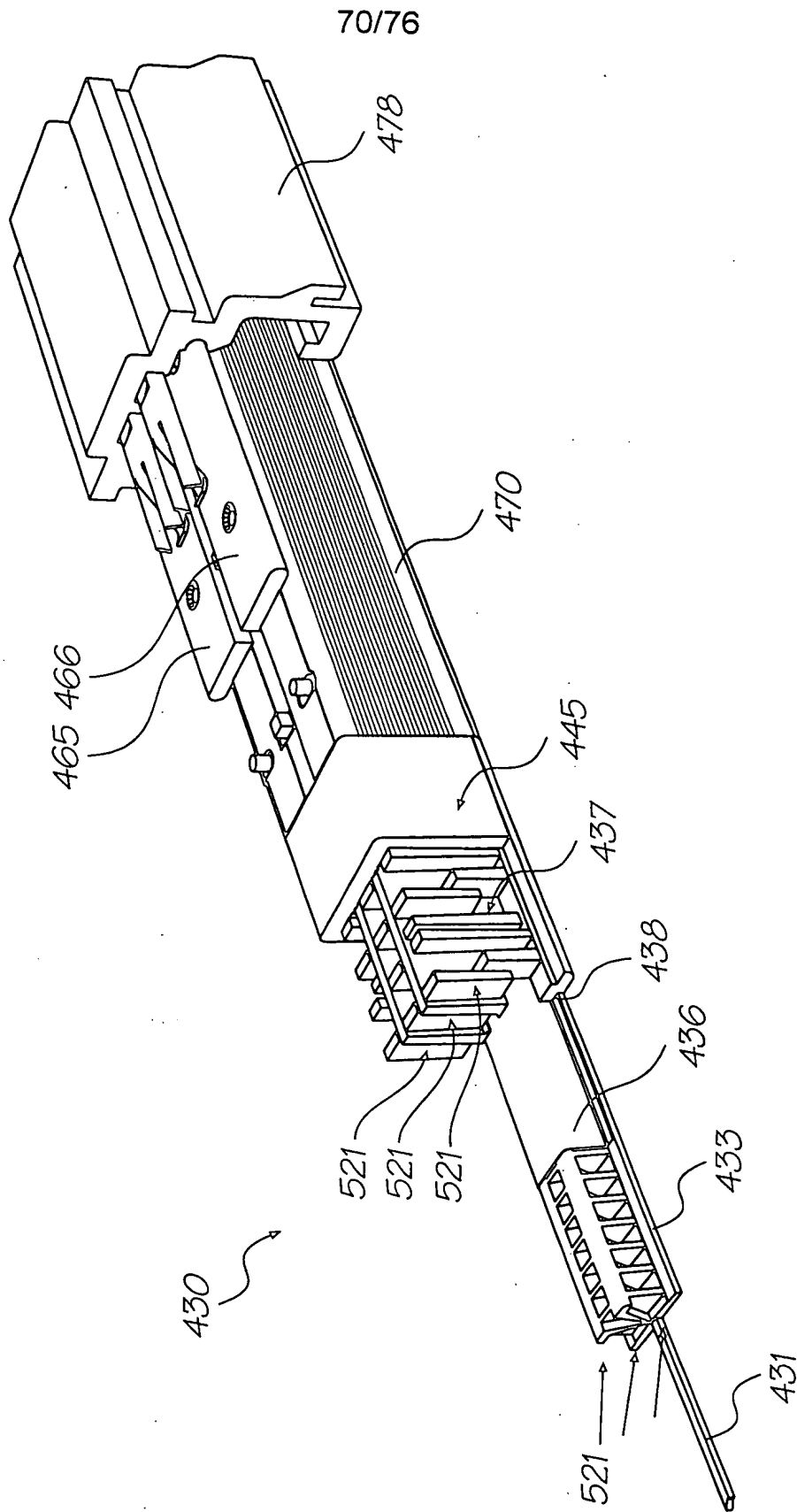
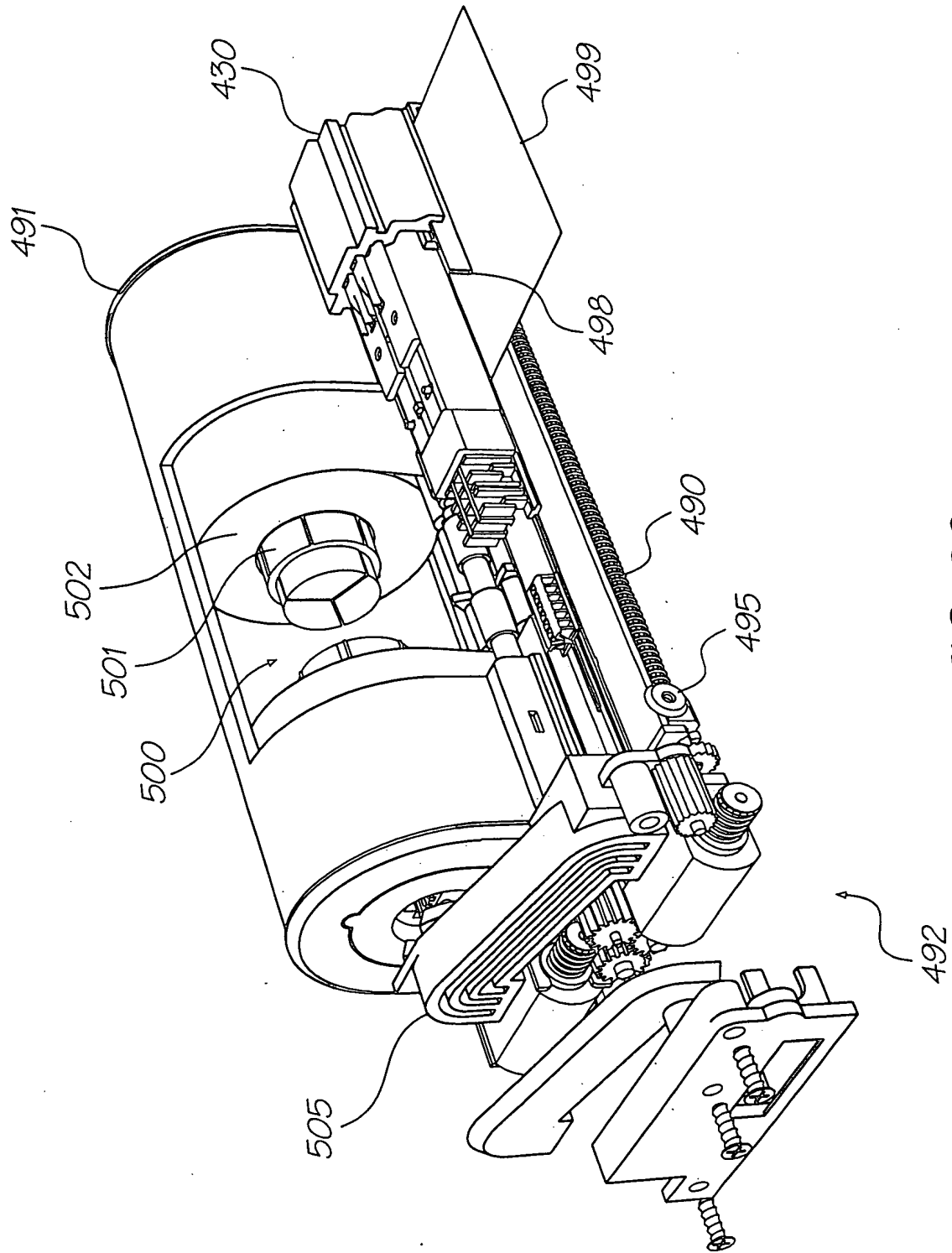


FIG. 97



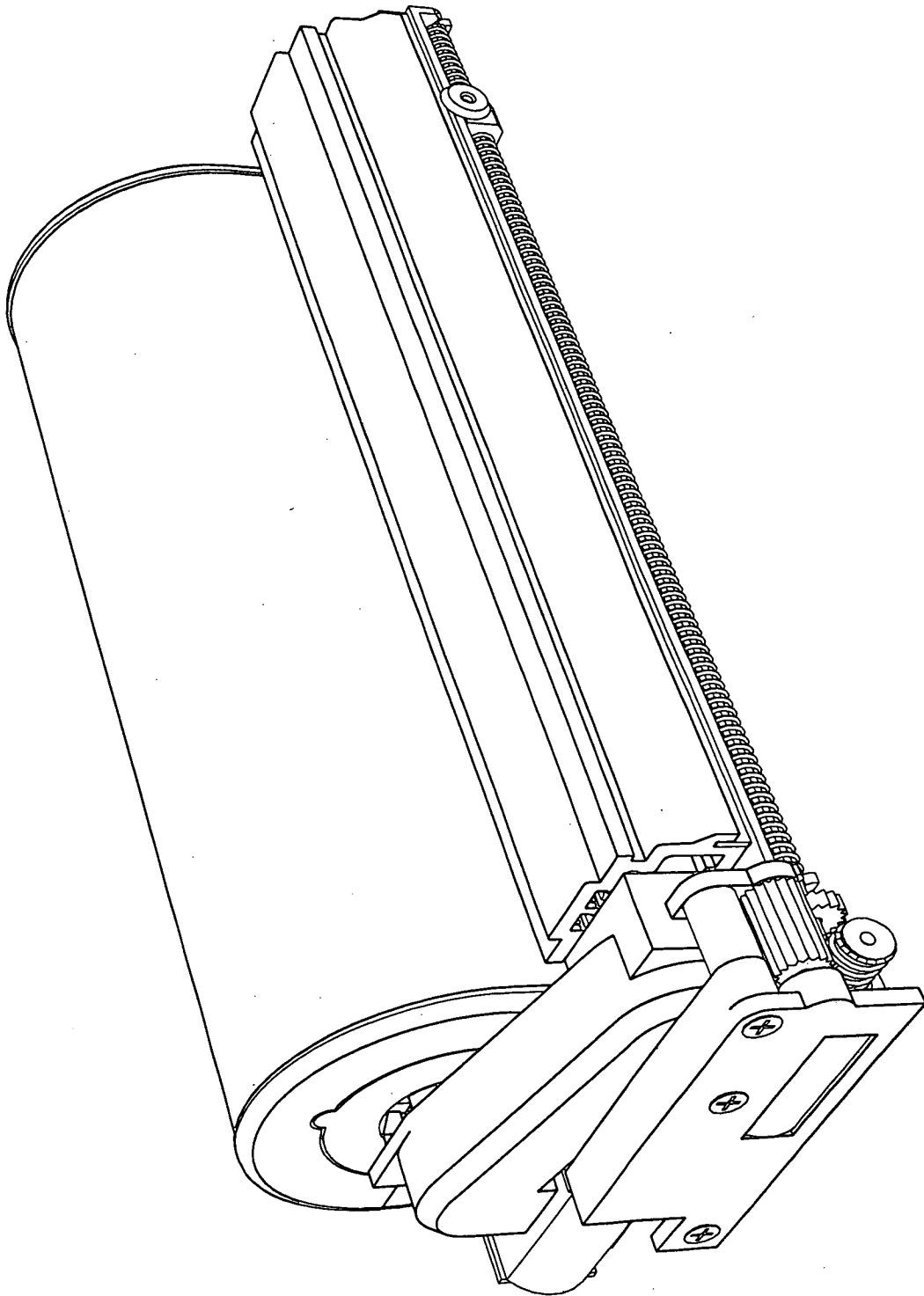


FIG. 99



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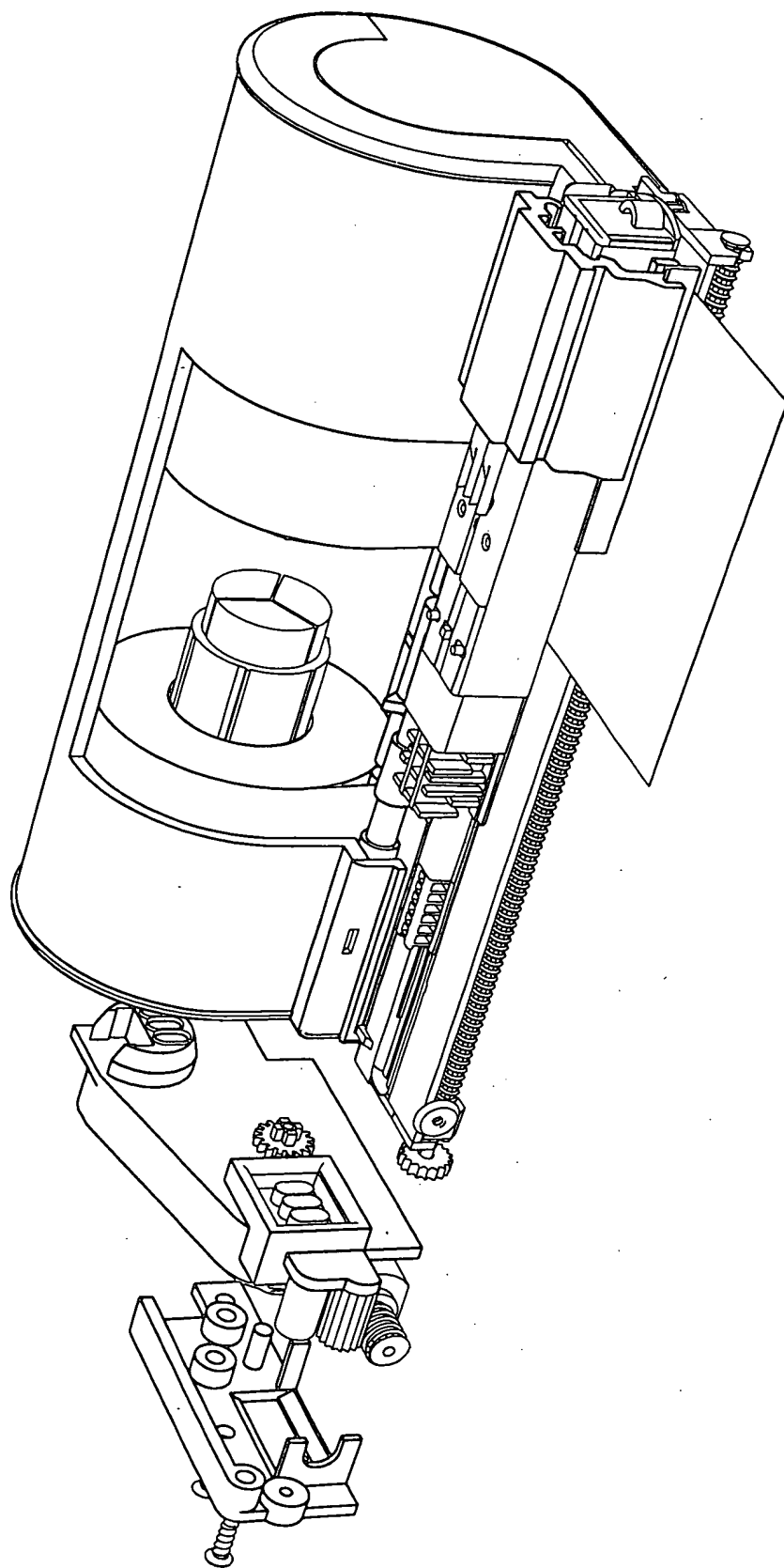


FIG. 100

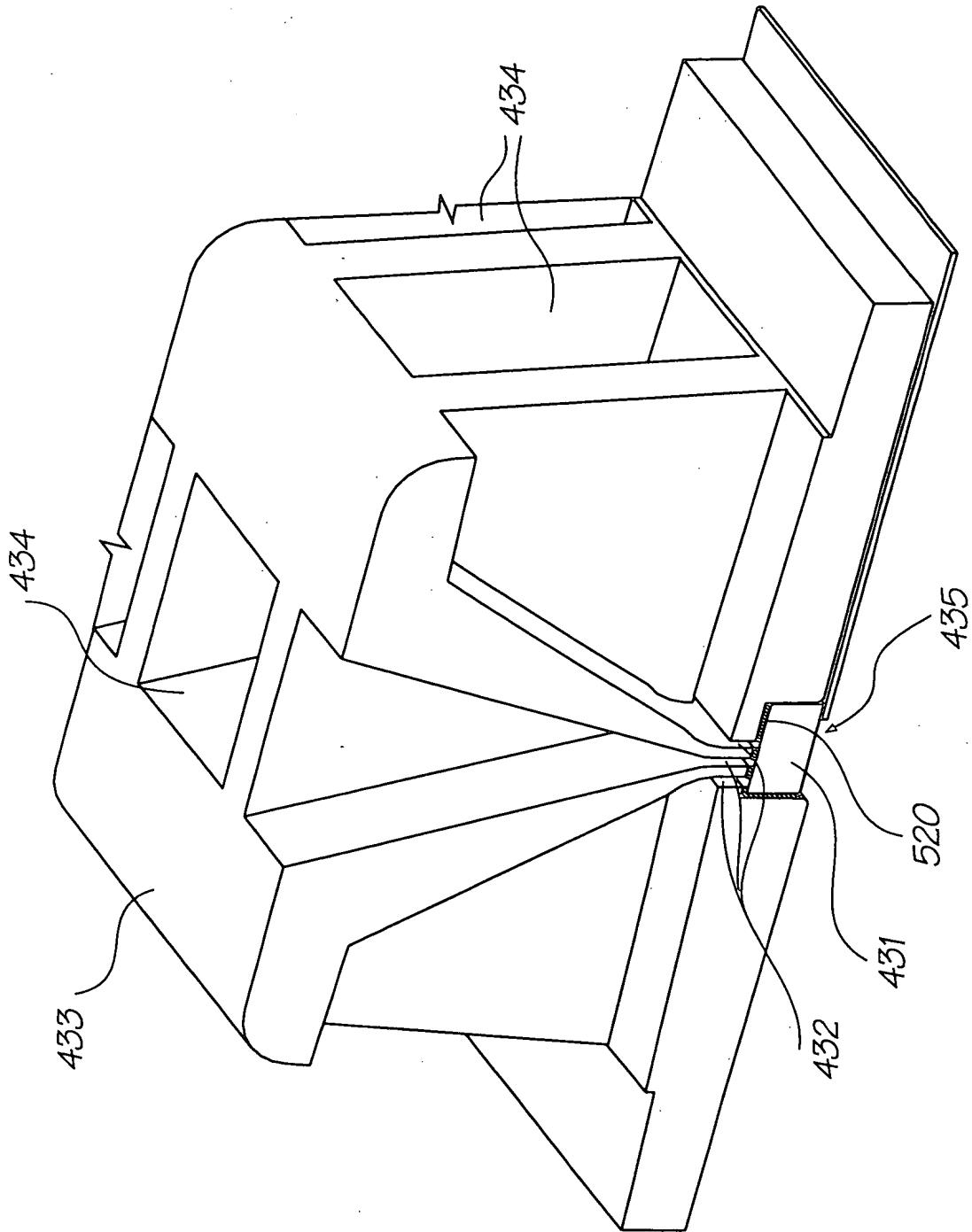


FIG. 101

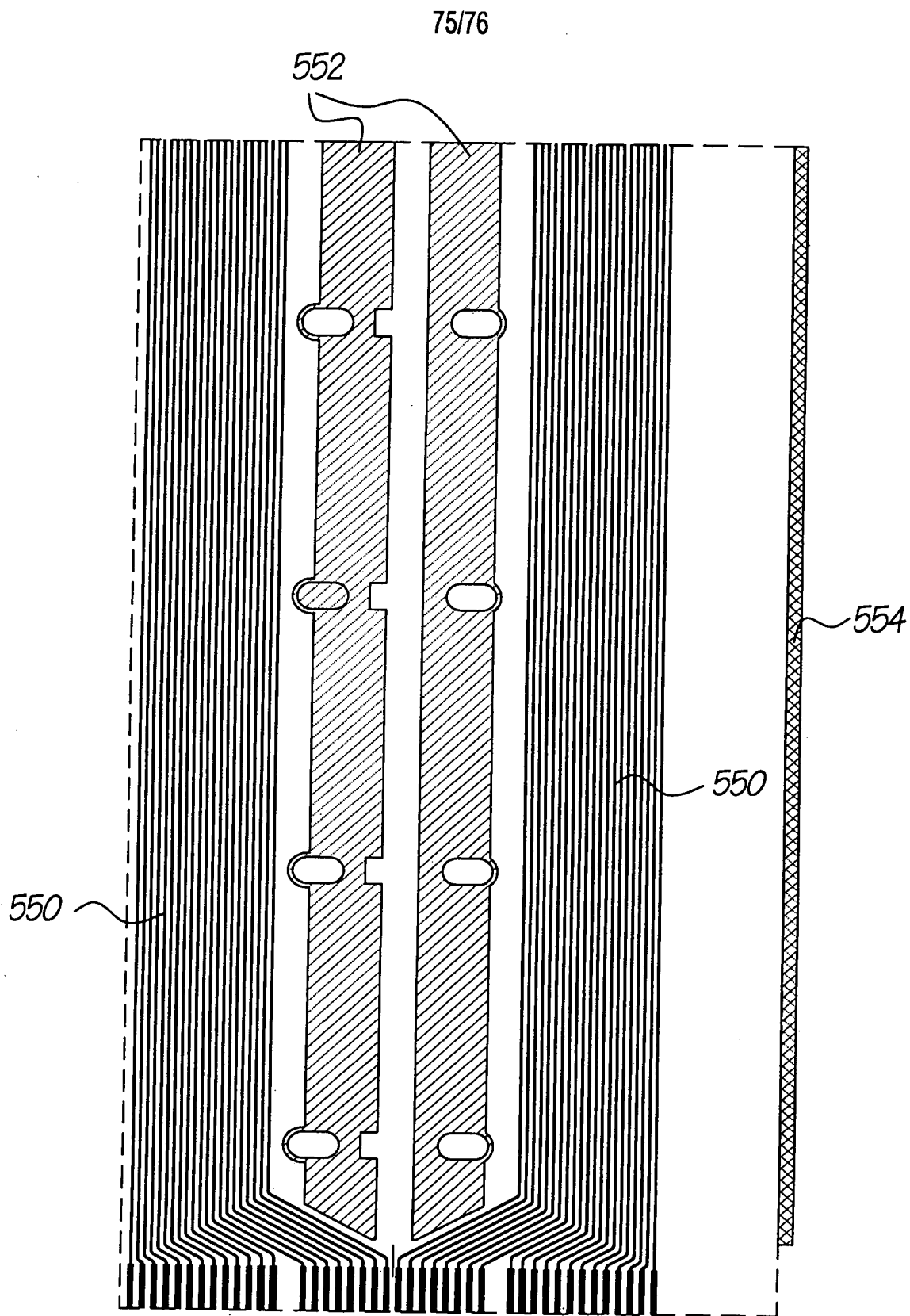


FIG. 102

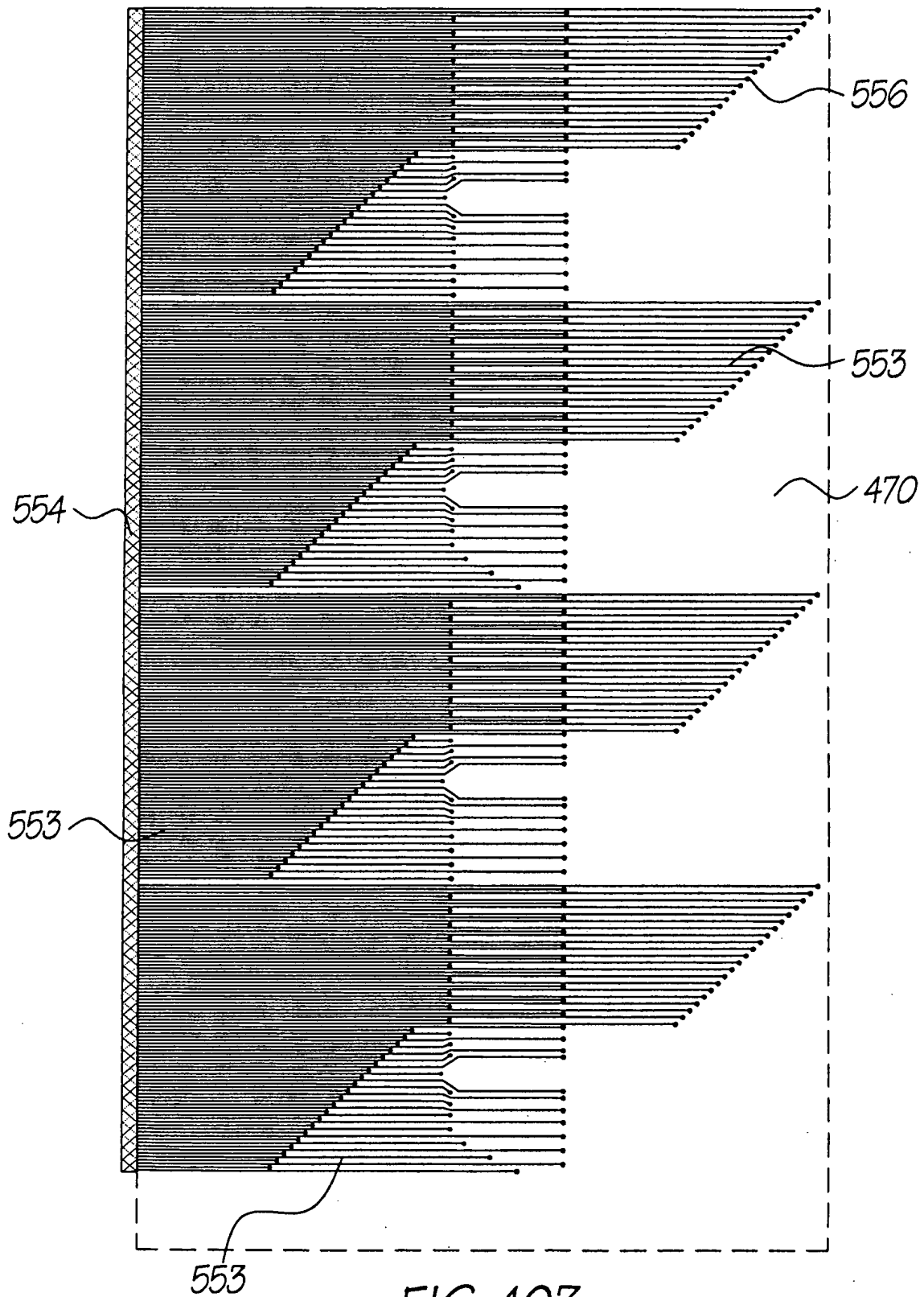


FIG. 103